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AN ILLUSTRATED REVIEW OF PROGRESS IN ELECTRIC AND OTHER TRACTION
WITH MOTOR TRAFFIC SECTION.

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THE Tramway & Railway World
WITH MOTOR TRAFFIC SECTION

Founded 1892. LONDON, JANUARY 13, 1921. VOL. XLIX.

NOTES ON THE ANGLO-ARGENTINE TRAMWAY COMPANY'S UNDERTAKING.

EXTENSIVE PLANT FOR MAINTENANCE AND CONSTRUCTION. SPLENDID EQUIPMENT FOR EMPLOYEES' WELFARE.

The undertaking of the Anglo-Argentine Tramways Company, immense as it is, has not escaped the difficulties which have beset smaller companies of like character as a result of the war. In fact, owing to the magnitude of its operations these difficulties have been all the more serious. No city in the world is more dependent on tramway facilities than Buenos Ayres, and the duty of providing the necessary facilities devolves almost entirely on the company. The magnitude of its work may be gauged by the fact that it employs over 9,000 men and operates 2,647 cars over 396 miles of track, including tramways and subways. In 1919 the number of miles run aggregated 53,646,027, and 370,734,985 passengers were carried. The receipts per car-mile were 14·75d., and the expenses 10·89d., excluding the cost of paving and renewals. For the last year before the war the corresponding figures were passengers carried, 342,140,422; car-miles, 50,872,935; receipts per car-mile, 13·98d.; expenses, 8·58d. While the receipts per car-mile have thus increased by 0·77d., the expenses have risen by 2·31d. This disproportion has inevitably created a serious situation, which has now fortunately been relieved by a concession from the Municipality which enabled the company to increase its fares in April last, and which will, it is anticipated, lead to the wiping off of the arrears of interest on its preference shares, and in a year or two to the resumption of payments of dividends on the ordinary shares. Throughout the period of the war the directors have pursued a conservative policy which will result in great ultimate benefit to the shareholders. Increase in capital has been avoided, although large sums have had to be expended in the expansion of the undertaking by the

Shop for Erection of Subway Cars for Buenos Ayres—Anglo-Argentine Tramways Company.

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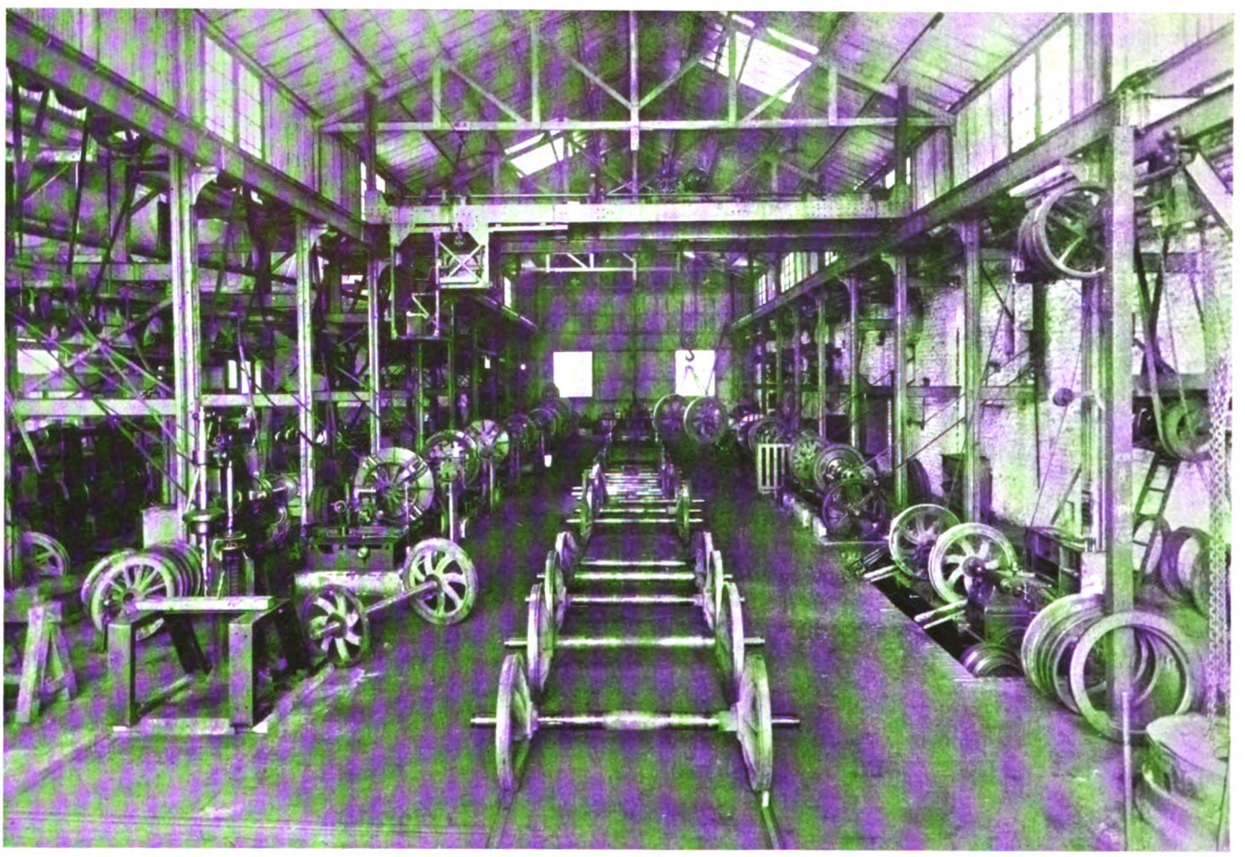
construction of extensive and well-equipped works for the manufacture of cars and equipment, including such specialised construction as track junctions and crossings. Much money has been required also for the welfare work for the staff, whose comfort and health are looked after in every possible way.

An interesting series of photographs recently received from Buenos Ayres, some of which are here reproduced, afford striking evidence of the enormous strides that the company have made within the last few years. During this period it was compelled to reorganise entirely its methods of construction and maintenance, and this had to be done under circumstances of extreme difficulty arising out of the war. Previous to that time the company had been accustomed to purchase its requirements abroad, but with the outbreak of war the source of supply was cut off. The British Government felt unable to permit the exportation of material and equipment which it was essential the company should obtain to keep its services in operation. It became necessary therefore that such provision should be made as to render the undertaking self-supporting, to enable it to execute all maintenance work, and to carry out in its own shops the manufacture of rolling stock and equipment, and the supply of material required for the overhead equipment and permanent way.

The extent of the shed specially reserved for the erection of cars built for use in the subways—these are really shallow underground railways—is well shown in an illustration. From this it will be seen that the company has made ample provision for the rapid and economical construction and maintenance of its rolling stock. The shed is provided with pits and electric overhead travelling cranes. During the year the subway rolling stock was increased by six new cars, and the number of subway cars now in service is 89. A number of cars were dismantled during the year and the serviceable parts of these were employed in the construction of 36 new motor cars. These new cars were built entirely of native timber. They are provided with vestibules, and have a small single operating platform, an arrangement that has enabled two additional seats to be provided, increasing the seating capacity to 36 without increasing the length of the car body. In these cars the rear door has been suppressed. This type of car has given excellent results, and the company have decided definitely to adopt it for their 1920-24 rolling stock programme.

As will be seen from the accompanying illustrations, the company's shops now include an iron foundry well equipped for the production of castings of various kinds and a foundry specially arranged for the casting of brake shoes. A wheel shop is equipped with an electrically operated overhead travelling crane, wheel lathes, and other necessary machines. Adjacent is an installation for fitting the wheels on the axles. The mechanical department and brass fittings department are equipped with a complete range of machine tools of the latest design, which makes it possible to carry out the great variety of work required by the company for the maintenance of its rolling stock.

The armature repair shop is also spacious and well equipped, and the work done during the year is indicated by the following summary—Armatures repaired, 695; field coils repaired, 267; armature bearings rebabbited, 5,292. The armatures burnt out showed an increase over the last few years. In the years



Wheel Shop Equipped with Lathes and Electric Overhead Travelling Gantry.

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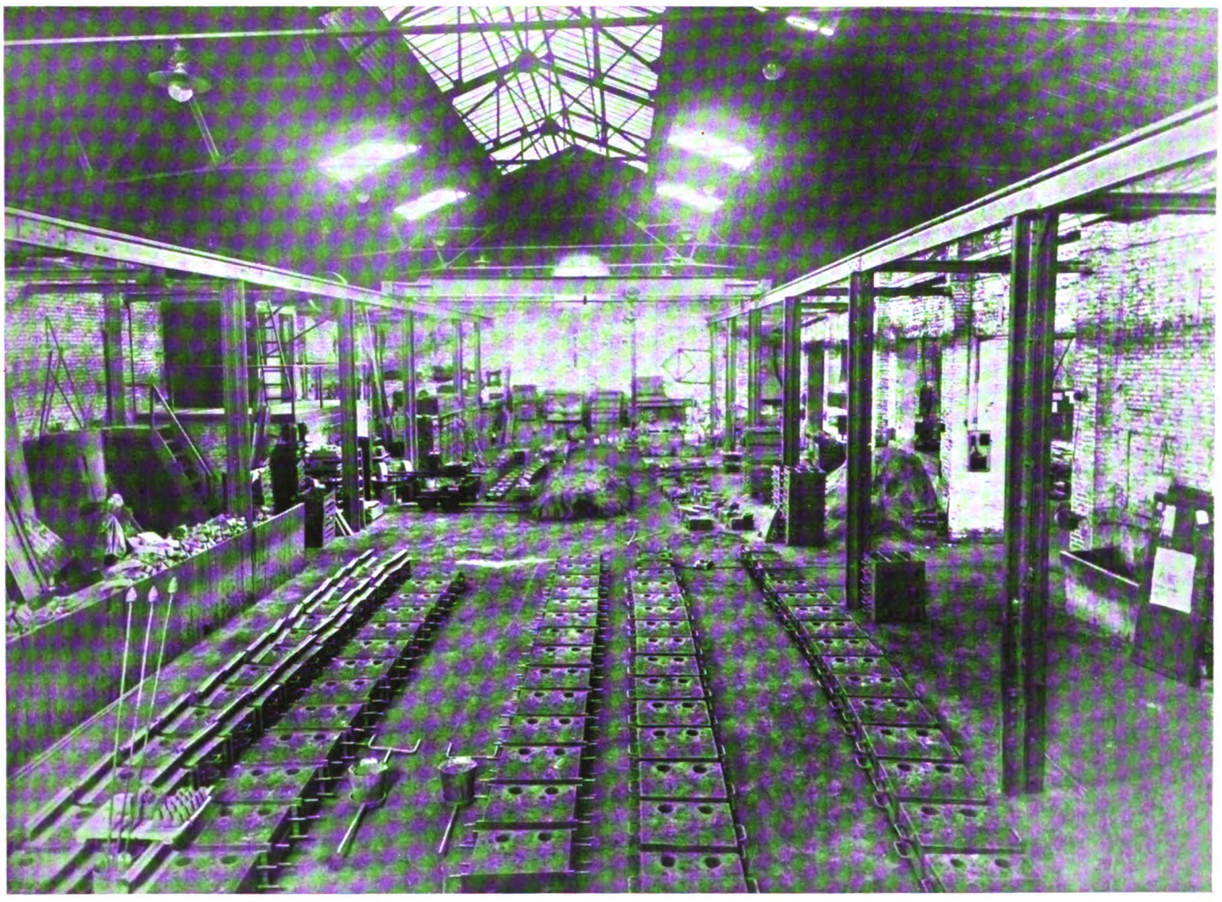
Iron Foundry.



Brake Shoe Foundry.

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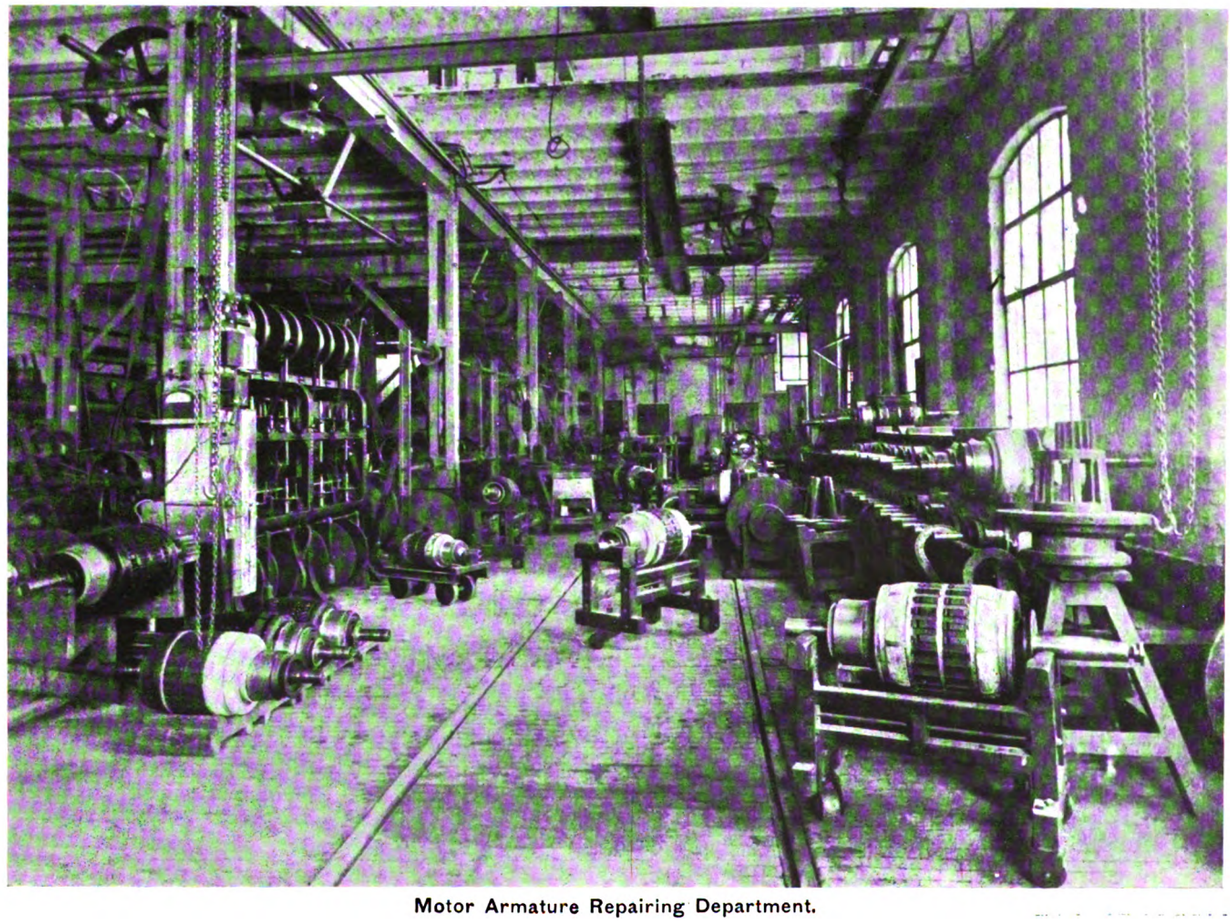
Mechanical Department.



Motor Armature Repairing Department.

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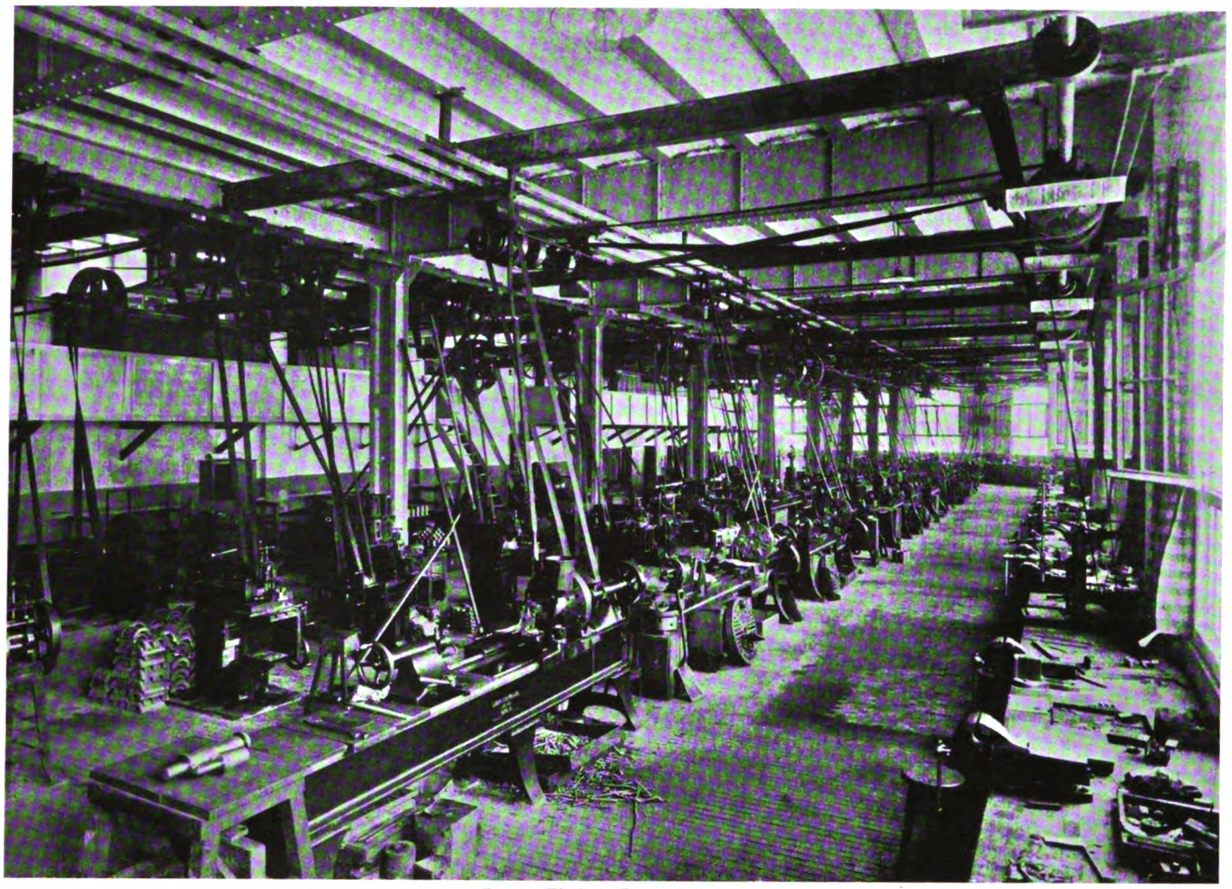
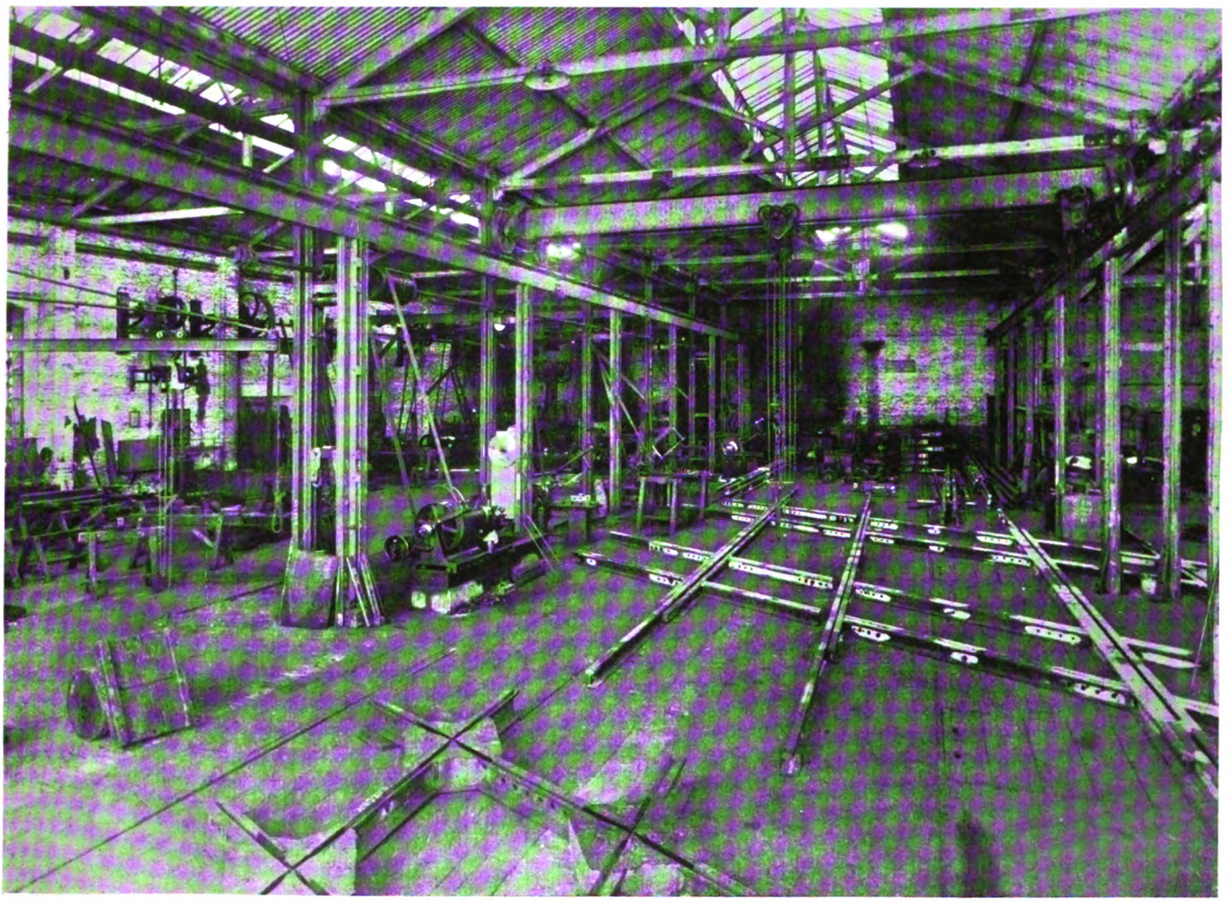


Brass Fitting Department.



Shop for Construction of Track Crossings.

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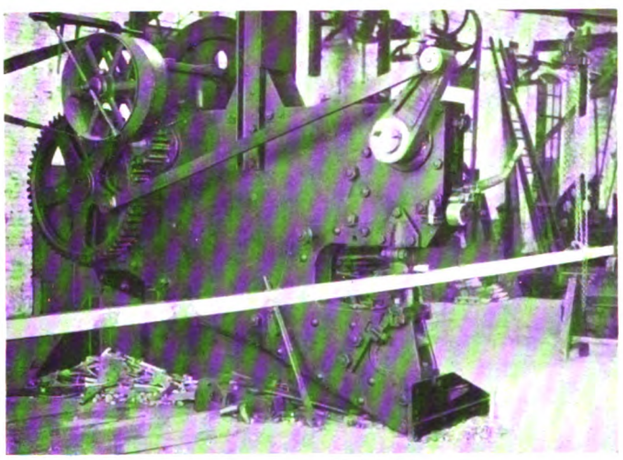
1910-12 practically the whole of the armatures were re-wound, but after a cycle of years the insulation gradually wears out and the armatures are burned and have to be re-wound anew.

The company have a very large number of track crossings owing to the plan of the tramway system, by which tracks have been laid in almost every street of any importance, and the maintenance and renewal of these is a work of considerable magnitude. These crossings are now constructed in the company's own shops, where the crossings are completed and are then taken apart and relaid *in situ*. The following summary shows the extent of the permanent way work carried out during the year :—

	Metres of Track Laid.	Frogs.	Crossings.	Points.	Curves.	Thermit Welded Joints.	Copper Connections.
Capital Account ...	2,246·86	7	10	5	7	64	481
Renewals Account... (Paving)	1,677·86	1	7	—	2	43	393
Renewals Account... (Worn out tracks)	1,639·77	6	2	6	6	—	407
Maintenance Acct.	7,298·44	75	73	48	25	—	9,311

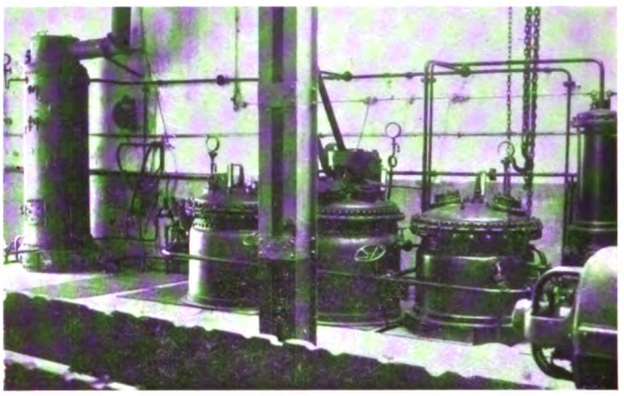
During the year the work of improving the negative conductivity of the tracks was continued, and 10,835



Rail Cutting Machine.

copper connections were employed, weighing in the aggregate 31,023 kilogrammes.

The company has always taken a broad view of its duties to its employees, and through the Mutual Aid Society every provision is made for the physical and moral welfare of the company's staff. The medical staff and all other services connected with the society are constantly being enlarged and improved in order that the men may have for themselves and their families all the assistance and consolation which it is possible to give them in times of distress. These efforts are recognised and appreciated by the men, as is fully proved by the fact that the services become more and more popular, and new doctors have to be appointed to cope with the additional work. There are well-equipped dispensaries and a number of consulting departments provided with the latest and most complete apparatus. These include an oculist's department, dentistry, and special rooms for the treatment of skin diseases, ear, throat and nose, children's diseases, surgery, X-ray, and massage departments. There is, it is safe to say, no other tramway company which has made more complete provision for the maintenance of the health of its employees and their treatment in cases of disease. For some time over 4,000 patients per month have on an average been attended. The men's confidence in the society leads them to apply to it in any little trouble, and the fact that they willingly resort to it is an important factor in the maintenance of the general health of the staff. The following



Vacuum Appliance for Impregnating Field Coils.

figures are of interest. The total number of persons attended during 1919 was 48,339, and 13,451 consultations were held at patients' houses; 85,835 consultations were held at the doctors' consulting rooms, while 233 patients were admitted to the society's hospital. This society grants benefits to the men who may be ill, and generally looks after their welfare in every possible way. The success of the new organisation is attributed largely to the centralisation of the services for at least four-fifths of the whole membership. The dispensary installed at the central consulting room has effected considerable economy. At the Sanford Rest Home, which is maintained by the society, 431 children of the employees are given fifteen days' vacation during the summer months. Excursions are provided every Friday, and they are attended by from 800 to 1,000 persons, most of whom are children of the employees.

The relations of the company with its employees are

A Corridor in the Mechanical Department.

now thoroughly satisfactory. Ever since the war broke out the company has suffered economically in reduced receipts coupled with advancing expenses, the high increase in the cost of fuel being the main

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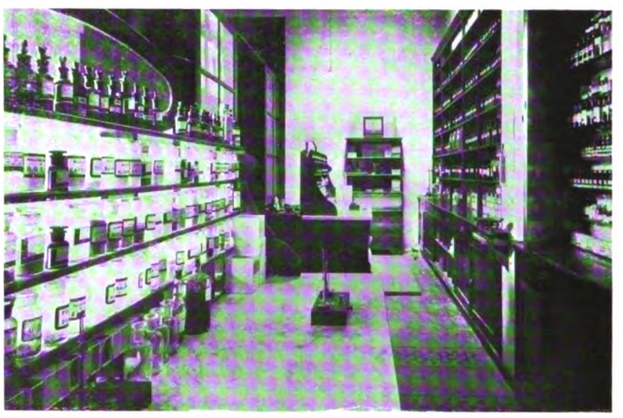
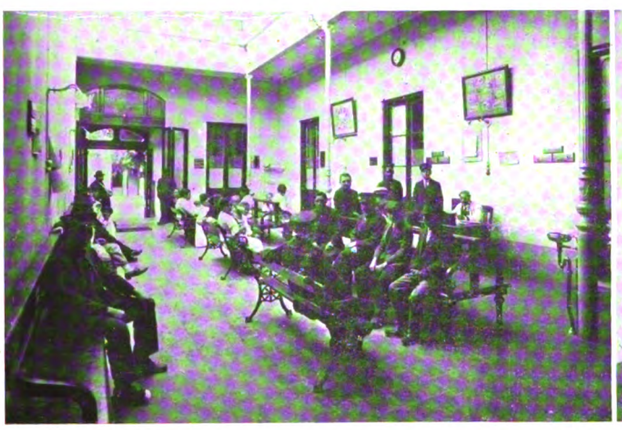
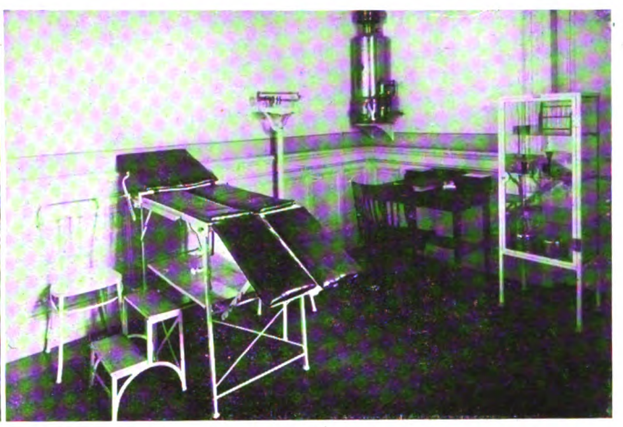
The Dispensary.



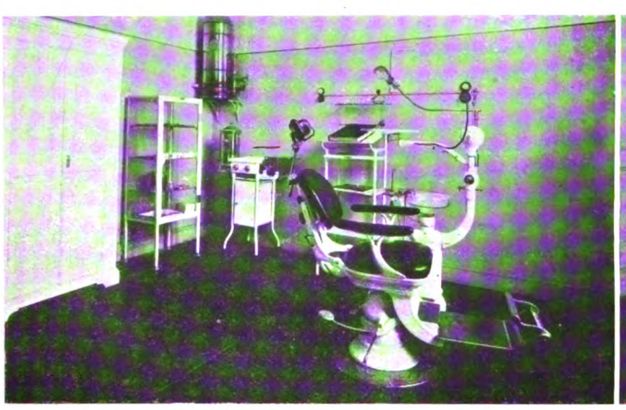
Dispensary Laboratory.



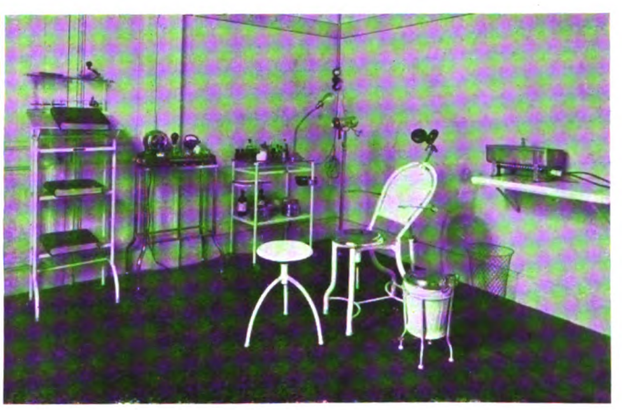
Employee Patients Awaiting Attention.



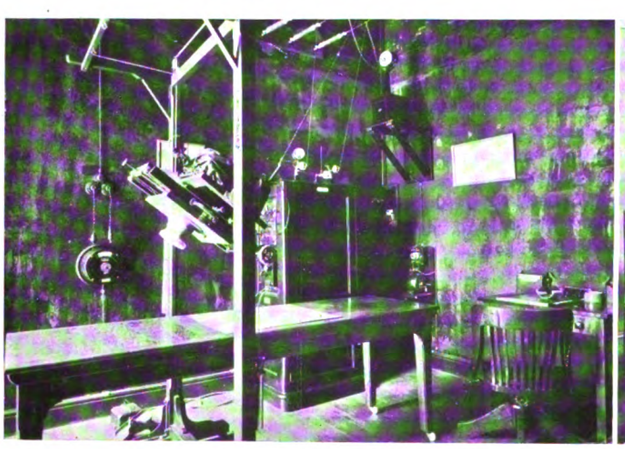
Clinical Medicine Room.



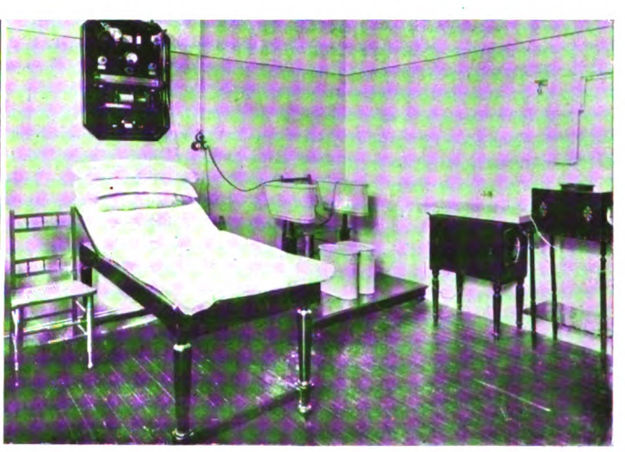
Dentistry Department.



Ear, Nose, and Throat Department.



X Ray Installation.



Massage Department.

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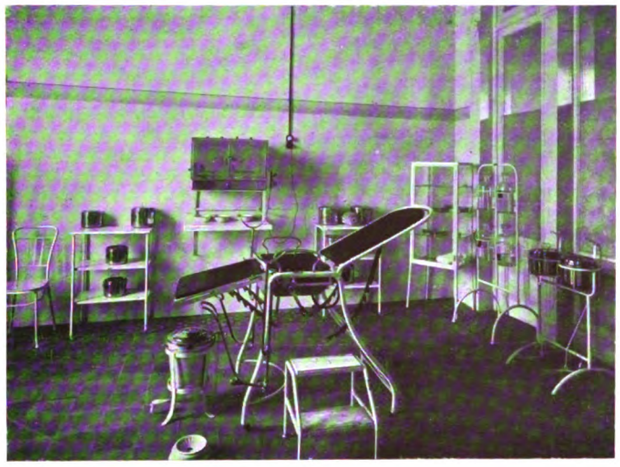
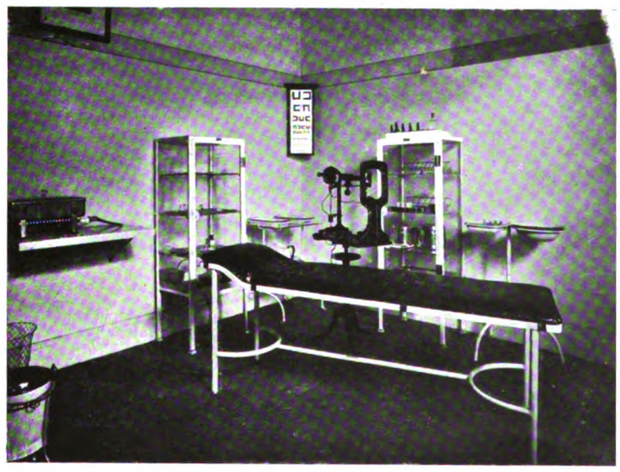
source of increased expense. In the Argentine, as elsewhere, wages have been gradually increased. To meet the new conditions the company long ago saw that it was necessary to obtain authority to increase their fares. The labour situation at the beginning of 1919 was acute, and the company decided to apply for authorisation to increase fares by 20 per cent.; and they asked the Municipality to appoint a committee of public accountants to examine the economic



The Surgery.

position of the company. Their report entirely proved the company's case, and eventually an ordinance was passed in the early days of January last and the new tariff became applicable on April 10. In compensation the company agreed to the following new conditions:—Minimum wages for all employees; eight hours' working day; increase of 10 per cent. on all wages over the minimum, and a contribution of 8 per cent. to the pension fund, to be recognised as an extra



Oculists' Department.

charge; after allowing 8 per cent. on capital actually invested, the extra profits to go to the Municipality; thirty kilometres of new track to be constructed by the company within three years; arbitration to be provided in case of labour disputes.

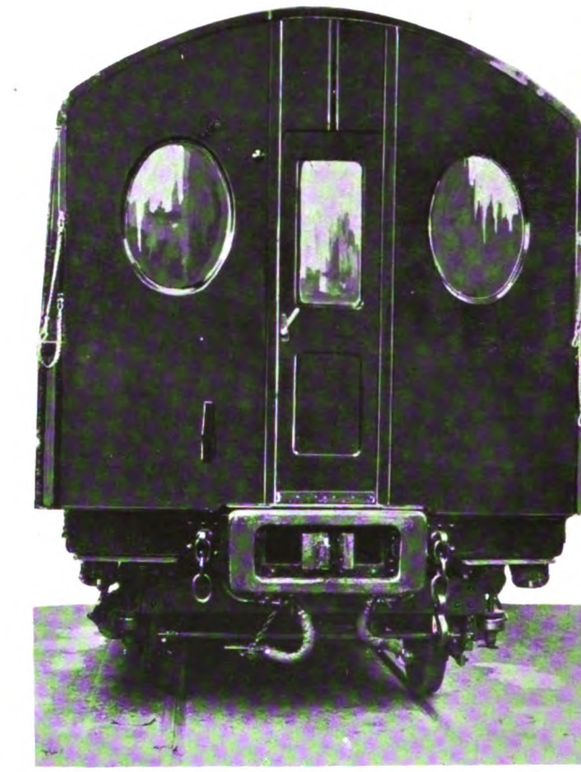
Although the new obligations are heavy, the new tariff, combined with the greatly increased traffic and decreased costs of electric current, have had a favourable effect on the finance of the company.

NEW LONDON DISTRICT RAILWAY CARS.

A Design Giving More Rapid Working and Greater Comfort.

With the object of operating an eight-car train service on the heavy traffic sections of the District Railway, orders were placed in the summer of 1919 for 100 cars of improved design. Several of these vehicles formed a train which made a trial trip on December 23 last, the cars forming the first instalment of this large order. The total cost of the hundred cars will be £750,000, or £7,500 per car.

The inaugural run was from the Mansion House Station to Ealing Broadway, and the train conveyed a large party of representatives of the Press, who were received by Mr. H. E. Blain, C.B.E., operating manager of the Underground Group, and Mr. Z. E. Knapp, manager for maintenance and construction. A most favourable impression was created by the new rolling



End View of One of the New District Railway Cars.

stock as part of the arrangements for extending London's electric railway facilities. In lighting, ease of running, comfort and general convenience the new cars are an immense improvement, and they are a proof of the great care that has been given to their design and construction. Many obstacles had impeded delivery of the cars, but the first batch was in advance of the company's best hopes. Now that delivery has begun, the remainder will be turned out at the rate of four every week until the whole order for 100 cars is completed. The builders are the Metropolitan Amalgamated Carriage, Finance and Wagon Company, of Birmingham the electrical equipment being entrusted to the British Thomson-Houston Company, of Rugby.

Both in design and construction the new cars represent a great advance. They are wider by 1 ft. than the old District cars—9 ft. 6 in. as compared with 8 ft. 6 in.—the body-width being extended almost to

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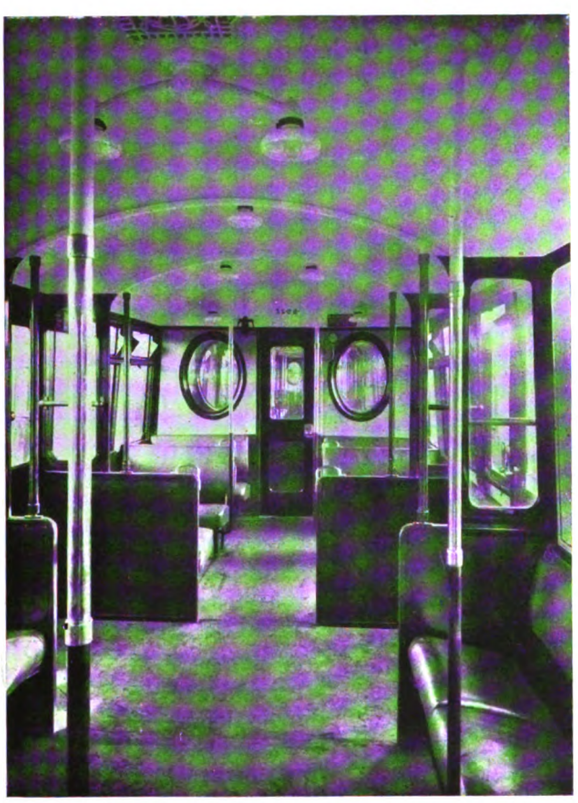
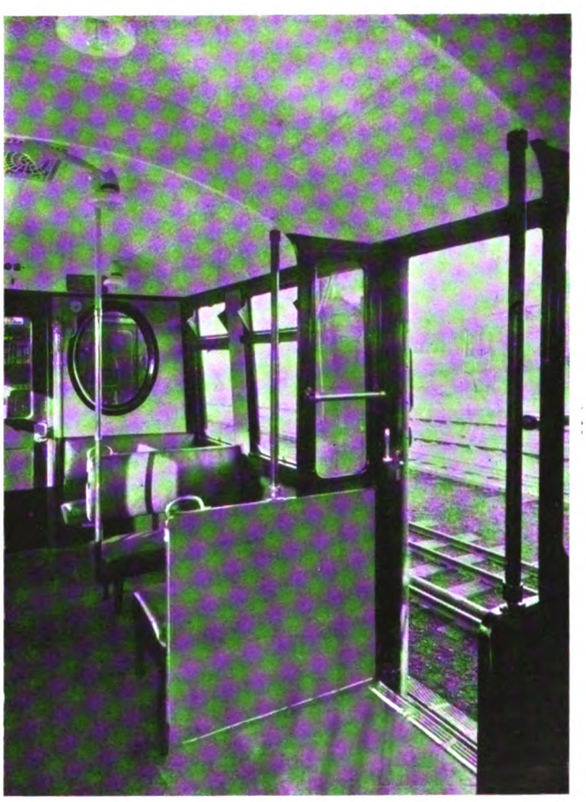
General View of Interior of New Car, Showing Lighting Arrangements, &c.



Showing End Door and Oval Windows.



One of the Side Doors Shown Open.

NEW ROLLING STOCK OF METROPOLITAN DISTRICT RAILWAY.

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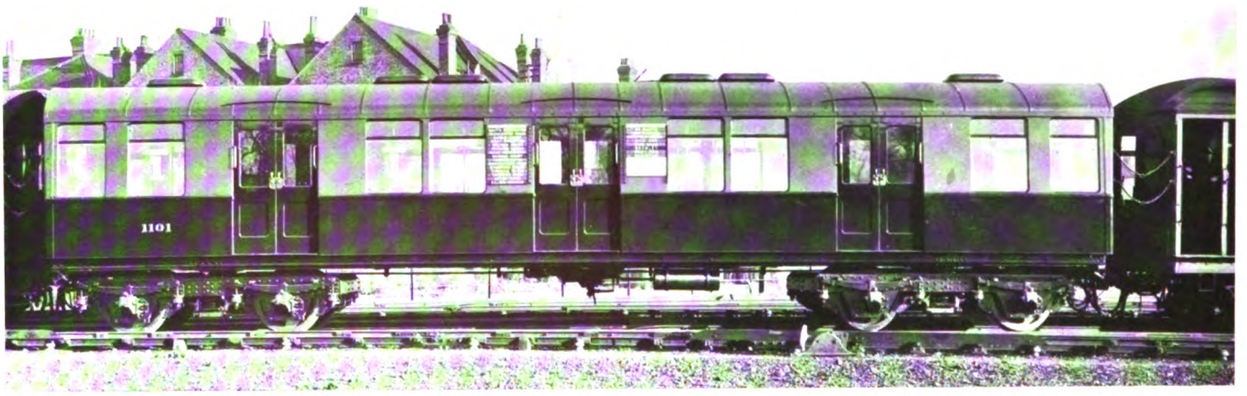
the limit of the step-board of the earlier type. The sides are slightly curved instead of straight. In length there is little difference, the new car being some 8 in. longer, that is to say 49 ft. 8 in. overall. The roof is arched instead of clerestory.

On the exterior the colouring is engine lake, a much deeper and more pleasing shade of red than the old-fashioned vermilion. Improved springing arrangements ensure easy riding, and the large bogies with which the trailer cars are fitted will make for silence and smooth running.



One of the New Three-Door District Railway Cars.

The motor coaches are of higher power than those of the older stock, and this will increase running speed—the new trains will be capable of 45 miles per hour on "non-stop" runs—and will also accelerate starting. Improved braking equipment has been adopted to secure more rapid and even stopping. These are points of great importance, as the problem of getting more trains through the tunnel sections depends not only on the time taken between stations or in station stops, but also upon the time taken in the processes of stopping and starting.

Internally, as well as externally, the new stock presents a different and greatly improved appearance as compared with the older cars. The arched roof is painted white, to give good lighting reflection. The lower portions are finished in a teak-brown shade to harmonise with the general colour-scheme of upholstery, etc. Special attention has been paid to lighting. The lamps are fitted in artistic brackets, and the light is evenly diffused by opal reflectors. The interior metal fittings and door handles are of Florentine bronze and nickel plating.

By reason of the added width, the new cars are much more roomy than the old. There are no straps, but hand rails and vertical pillars are conveniently placed at points near doorways and open spaces for the support of standing passengers. In the flooring the usual wooden slats are replaced by linoleum. At the end of each car there are large oval plate-glass windows, which give a very decorative effect.

In the arrangement of the doors is seen the most important feature of all, from the point of view of the travelling public. Each trailer car has three double sliding doors on either side. Each of these three doors is wide enough to allow two passengers to enter or leave the car side by side at one time.

The old type of "vestibule" at either end of the car is dispensed with, and in the new cars the doors are spaced at equal intervals along the side of the coach, so that, in whatever part of the car a passenger may be seated, he will always have a door conveniently accessible. On the motor cars and control trailer cars, in addition to the three double doors, single doors are fitted at the ends of the cars, and these doors will also be available for the use of passengers when not occupied by the operating staff of the train.

The Old and the New Types of District Railway Cars.

An eight-car train of the new stock will give the equivalent of 52 single doors throughout its length for the use of passengers entering or leaving. The pro-

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vision of these facilities for alighting and entering will still further reduce the time taken in loading and unloading at stations, and will thus accelerate the operation of the individual trains and enable more trains to be run.

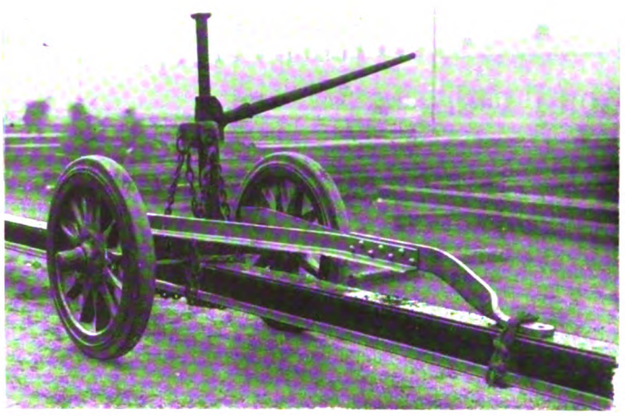
As has been pointed out, it is the company's intention, for the relief of rush-hour congestion, to set up in place of the present five, six, or sometimes seven-car trains a regular service of eight-car trains. This will mean, both for the travelling public and the railway staff, a great lightening of the pressure during the busy periods of the day.

The new eight-car set will be made up of two self-contained components of five and three cars, respectively. It will thus be possible to operate one portion of the eight-car train as a five-car train during the slack hours, while the three-car portion can be utilised for service at the same time on certain local sections of the line where traffic is light. This will combine economy of operation in the slack hours with greatly increased efficiency in dealing with peak-load traffic.

A new feature of interest to the travelling public is the provision of two sets of train indicators, one on either side of the centre doors, showing "non-stopping" stations both in the East and the West End of London.

NOVEL APPLICATION OF A SIMPLEX JACK

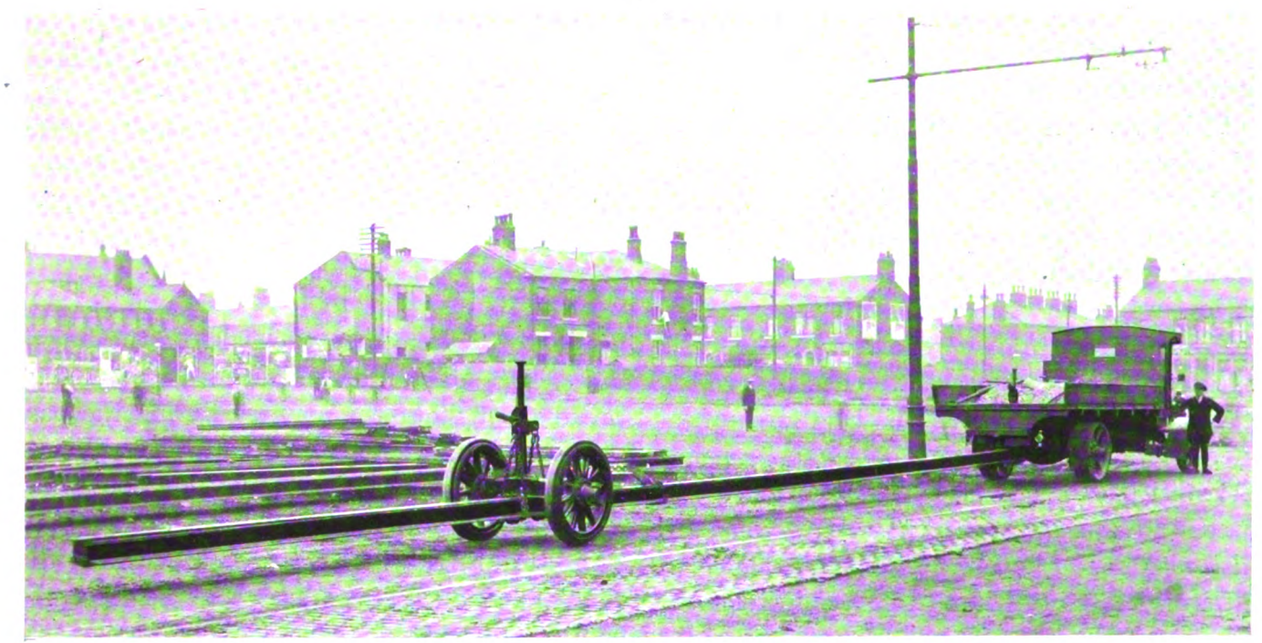
The accompanying illustrations show an ingenious adaptation by a provincial engineer of a Simplex jack for the means of lifting and transporting tram rails.



Jack and Rail Carriage.

chain slings and a special cross iron piece which rests upon the toe of the jack. After lifting the rail it is braced to the yoke by a piece of rope in the manner clearly shown in the photograph. The wheels of the carriage are of the artillery type with rubber tires. The rail and carriage can then be easily transported by towing behind a motor lorry, the rubber tires reducing the ringing noise of the rail to a minimum.

The jack can be easily removed when required for other work, and saves a lot of labour. The illustrations have been sent to us by the Equipment and Engineering Company, of 2 and 3, Norfolk Street, London, W.C.2.



Application of a Simplex Jack to the Lifting and Carrying of Rails.

This portion of tramway work entails a considerable amount of labour and cost when performed in the ordinary way, and is a detail which frequently receives but scant consideration.

It will be seen that the contrivance consists of a two-wheeled car with a projecting yoke. Upon the centre axletree there is mounted a No. 19 Simplex jack, which is arranged to lift the rails by means of

A Birkenhead Water Power Scheme.—Birkenhead Town Council is considering a scheme for utilising the water from the town's reservoir in North Wales to generate electricity. Ten million gallons of water are released daily at the reservoir, and it is proposed that power generated by this means should be conveyed to Birkenhead and Wirral, a distance of 40 miles, by overhead cables.

Essex Light Railway Scheme.—A scheme has been prepared for a light railway from Ongar to Dunmow, 13 miles in length and costing £163,000.

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THE EDITOR will be glad to consider articles by experts. All information of a practical character relating particularly to the engineering and operating branches of transportation will receive prompt attention. Original illustrations will also be welcome.

LONDON, JANUARY 13, 1921.

The Steel Position. The condition of the British steel industry is one calling for grave reflection. More and more it is becoming apparent, judging from current news items from day to day, that the British steel manufacturer, or at all events those who sell goods made of steel, does not compete in price with the United States and Belgium. In the case of the former the reason ascribed is the cheapness arising from mass production; in the case of the latter it is low wages as compared with those ruling here. The last instance reported in the case of the tramway industry was the acceptance by the Tramways Committee of Bradford of a tender by a Belgian firm for some tramcar wheel steel tires. The price was reported to be between 40 and 50 per cent. below that of British makers. Another peculiar point alleged was that while nine British firms tendered their prices were all alike. If that is so, it points to a combination destructive instead of helpful to the combiners. Just at the time of writing we hear of a case of one English firm alone which in the past six months has imported steel from Belgium of the value of nearly £300,000. In the recent past we have had American tramway rails coming into this country at lower prices than the British manufacturer could quote. Reports from America are to the effect that a further decline in prices is in progress, that unemployment is increasing, and that wages are materially coming down. These things point to still lower quotations for American steel products in this country. Here also unemployment is increasing, prices of some things are a trifle lower, and the first whisperings as to reductions in wages have begun. Economic law seems to work more speedily and surely in America than it does here, but no doubt it will work. Prices and wages will have to come down. Sir Herbert Austin, M.P., of the Austin Motor Company, Birmingham, the other day asserted that the root of the whole trouble in the engineering industry to-day is the miners' wages. These wages, however, are going up under the new sliding scale. The increased production of coal, which gives the miners the increased wages, has been accompanied by a fall in the price of export coal, due to increased production abroad. This in turn threatens a higher price for coal for home consumption, or else a reduction in British miners' wages. The whole position is very difficult. We cannot easily compete with the prices of easy-won coal in America. Labour-saving and mass production in steel and other industries are highly developed there. "Go-easy" methods are said to be rare. Neither can we reduce wages to Belgian levels. Time is needed before the position can begin to rectify itself.

The Tramway Wage Question. Viewed in the light of the unemployment which has become widespread throughout the country during the past few months, the claim of tramway employees for higher remuneration must be somewhat exasperating to the millions who are without wages at all. Nowhere has the case against the union's demand been more convincingly put than at Sheffield. The newspapers of that city recently contained a letter written by Sir Wm. Clegg, the chairman of the tramways committee, who showed that in wages and bonus the motormen receive £4 7s. 8d. per week and the conductors £4 3s. 4d. In 1914 motormen were paid £1 17s. 11d. and conductors £1 14s. 2d. These amounts are exclusive of free rides, free uniform, and nine days' holiday per annum

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with pay. The effect of the present payments on the undertaking is that out of every twenty shillings collected in fares, 10s. 2d. is paid to the employees. Sir William Clegg gives a good reason why Sheffield Tramways Committee and the majority of tramway undertakings refused to submit the case to arbitration. In addition to the main objection—the inability of the industry to bear any additional expenditure—he says that arbitration would have caused unnecessary trouble and raised expectations for no good purpose. That statement is in effect a reliable anticipation that arbitration would go against the employees. The Sheffield chairman advances the following reasons for his assertions--

(1) Compliance with the Sheffield demand will mean an additional expenditure of £67,000 per annum, all of which would have to be collected by increased fares.

(2) Unemployment and short time amongst workmen will not enable such workmen to pay any increased tram fares to travel between their homes and work.

(3) In the opinion of the tramways committee, motormen and conductors are already sufficiently remunerated for the services they render.

(4) The employees in tramways undertakings are not liable to such fluctuations of trade conditions as are other workmen. They have a much greater certainty of regular employment and wages.

(5) It is anticipated that owing to the causes mentioned in Paragraph (2) considerable reduction will take place in the number of passengers to be carried, and the revenue will consequently decrease.

(6) There are signs of falling prices in the cost of living, and therefore there is not the necessity for an increase in wages.

Since Sir Wm. Clegg cited the sixth reason the cost of living has further fallen, and the ship and house building industries are faced with claims for a reduction of wages, while the wholesale and retail dealers in clothing and other goods are content to sell at a loss in order to obtain capital. Facts like these have already impressed tramway workers, and should count for more than any promises that may have been made on the amalgamation of their unions. This is not the first time that optimistic dreams in the industrial world have proved delusive, and the organisers would be wise to bow to the inevitable. Before long they may have to consider a suggestion for reduced pay. That is a possible result of the investigation that is about to be undertaken by the so-called Court of Inquiry that has been appointed by the Minister of Labour. The body is not in any sense a court of law, and its appointment does not render comment on the subject of its inquiry undesirable. The more the facts are emphasised the better it will be for all concerned.

A Lesson from Newcastle.

What happened at Newcastle at Christmas should not be lost sight of by those interested in the management of tramway undertakings. While the insubordinate tramwaymen who failed to appear at the car sheds on Christmas Day have been reinstated by the committee, we are glad to note that the committee accompanied their generous act of clemency by a warning which left no doubt as to their determination to see that the committee and not the men are responsible for the running of the city's tramways. It is for that reason that what occurred should not be lost sight of elsewhere, for it is openly recognised that some tramway committees came to the decision not to run Christmas Day services because the men had decided not to work—an abnegation of their powers which is neither consistent with self-respect nor fair to the public, whom the committees are supposed to serve. The Newcastle committee have shown that by acting firmly, and proving that they are not a spineless body, their due authority is recognised, and caused the men to come back asking for reinstatement and admitting through their representative that they had put themselves in the wrong. The history of events at Newcastle is hardly flattering to the men or their supposed leaders. By ballot they decided not to work on Christmas Day. The Tramways Committee decided that the tramcars should be run. The men held a meeting on Christmas Eve, and confirmed the decision of the ballot. On the following day only 237 men failed to turn up at the sheds out of 950 detailed for duty, and practically a full service was maintained. The 237 men were promptly suspended until the next meeting of the committee six days later. There would have been little difficulty in the present state of the labour market for the committee to have filled all their places, but they were no doubt guided in their generous decision by the fact that some men who voted in the ballot for working abstained from going to work out of loyalty to the union. It is obvious, of course, that many who voted to strike had so little courage to enforce their convictions that they straightway went to work. At any rate tramway committees in this country can now feel that so long as they have the confidence of the public they will do well not to abrogate their

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authority at the summons of a few loud-voiced agitators, even if these have secured apparently powerful support. It may be noted with some satisfaction that the Burnley Tramways Committee has decided to refer the question of Christmas Day tramcars to the Joint Industrial Council with a view to some national arrangement being arrived at with the representatives of the men. The step may be welcomed if only because it may have the effect of getting a decision which at least would end the present unsatisfactory methods adopted in different parts of the country. We should like to hear the Council tell the tramway committees everywhere that in such a simple matter they should be masters in their own households.

Cement Shortage.

Municipalities and contractors engaged in tramway track construction and building schemes are indebted to Councillor J. Timpson, the Mayor of Portsmouth and the chairman of its tramways committee, for having verbally brought to the attention of the Prime Minister and several members of the Government the serious position arising from a shortage of cement. The occasion was the visit of a deputation from thirty-three towns to urge the taking of further steps to assist the provision of work for the unemployed. Several members raised the question of the holding up of materials, and in this connection Councillor Timpson stated that an extension of the tramways was being held up because the cement supply could not be guaranteed. As half of the £100,000 which the work will cost will go to unskilled labour, the delay had seriously affected the problem of unemployment. With the pertinacity which he has shown during three years' service as chief magistrate, the Mayor pressed the matter, and was given the assurance that the Government would investigate the question of cement supplies. The Ministers of Transport and Health were among the departmental chiefs supporting the Premier, and ten days prior to the reception of the deputation Sir E. Geddes had listened in Parliament to a complaint by the representative of Bournemouth that tramway reconstruction in that town had come to a stop for want of cement due to that material being sent abroad. Sir Eric's reply was that he had no control over the manufacture, but he was informed that the percentage of the output now exported was considerably less than in pre-war days. As far as he knew there was now no control of cement. Pressed by other Members as to whether its export was not causing a great shortage in this country, the Minister said he believed there was a shortage. While he would be very glad to arrange for the carriage of cement, he was not responsible for matters of export, as to which question he suggested that inquiry should be made of the President of the Board of Trade. It may be pointed out that Portsmouth and Bournemouth are not the only places where track relaying and extensions have been seriously interfered with for lack of cement. While there seems to be no ground for criticising the Transport Ministry, we would suggest that Sir E. Geddes as a business man should bring about a reform in the system of preparing replies given to questions put to Ministers. After all the war period talk of co-ordination between Government departments, it is time to attain some practical result. In the case of the question put to Sir E. Geddes, the official who prepared the reply ought to have had sufficient vision to understand the importance of obtaining the views of the Board of Trade and the Ministry of Health. For lack of such commonsense procedure Members are frequently bandied from one department to another, and it is time that the practice ceased. We may add that on the cement question the Board of Trade statistics show that in October 1913 the imports amounted to 12,300 tons, and in October 1920 to only 2,000 tons. In October 1913 the exports were 63,500 tons, and in October 1920, 63,300 tons. The reason for such heavy exportation appears to be that cement realises 20s. in Continental countries as against 15s. here. For the sake of the extra 5s. per ton British housing and tramway construction are at a standstill and men lack employment. The matter is too vital to be left in its present position, and calls for instant Government attention.

Southend Light Railway.—The order made by the Light Railway Commissioners, and confirmed by the Minister of Transport, authorising the construction of a light railway in the Borough of Southend, has been published in a White Paper (Cmd. 1,065, 2d.).

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TRAMWAYS INDUSTRIAL DISPUTE.

COURT OF INQUIRY APPOINTED.

In consequence of the decision of the Municipal tramway authorities not to arbitrate on the new wage demands (reported in our issue of December 16) negotiations were broken off at the conference of the National Industrial Council on December 7. On the following day the parties again met, at the request of the Ministry of Labour, but no further progress was made. The Minister of Labour (Dr. Macnamara) issued the following statement—

> " At the invitation of the Ministry of Labour a special meeting of the Joint Industrial Council for the Tramways Industry was held on December 15, under the Chairmanship of Sir David Shackleton, in order to discuss the possibilities of a settlement of the workers' claim for an increase of wages.
>
> " The employers' side found themselves unable to depart from the decision of their constituents not to refer the claim to arbitration.
>
> " In the circumstances of the case the Minister of Labour has decided to establish a Court of Inquiry under Part II of the Industrial Courts Act, 1919. The necessary steps to form the Court will be taken as early as possible."

The Executive of the Transport Workers' Federation subsequently considered the Minister's decision, and on December 16 the Executive Committee of the United Vehicle Workers' Union approved of the investigation and decided to discountenance any strike pending the result of the inquiry.

It was stated that Mr. E. Bevin and Mr. J. Cliff would present the men's case. The Unions are understood to base their claim to an increase in wages of 12s. a week for men and 6s. for youths on the fact that the cost of living has risen from 130 to 176 per cent. since the last increase was given. They also contend that while the railway men have received a war advance of 52s. per week the tramway workers have only had 43s. They take the position also that wages cannot be dependent on the earning power of the industry. The position which confronts tramway employers is that the industry is worked at a loss of £3,300,000, and that there is very little, if any, opportunity for a further increase in fares.

Representatives of Municipal tramway authorities met in London on December 21, to consider the position created by the decision of the Minister of Labour to hold an inquiry. After a long discussion it was decided that the municipal authorities should be represented at the inquiry, and Mr. J. B. Hamilton and J. M. McElroy were requested to place their case before the committee.

Private companies represented by the Tramways and Light Railways Association met on the same day, and it was understood that some of the companies would state their case before the Court.

MEMBERS OF THE COURT OF INQUIRY.

The Secretary of the Ministry of Labour, on January 7th, announced the constitution of the Court of Inquiry as follows—

The Right Hon. Sir David Harrell, G.C.B. (Chairman).
Mr. Harry Gosling, C.H.
Mr. G. H. Hume.
Mr. W. F. Purdy, O.B.E., J.P.
Sir Herbert Rowell, K.B.E.

The terms of reference are to inquire into the causes and circumstances of the dispute between the employers' representatives and the workpeoples' representatives on the National Joint Industrial Council for the Tramway Industry, and to report thereon to the Minister of Labour.

The Secretary is Mr. H. C. Emmerson, Ministry of Labour, Montague House, Whitehall, S.W.1, to whom all communications should be addressed.

Sir David Harrell, who was Under-Secretary for Ireland, 1895-1902, was chairman of the Committee on Production during the war and of its successor, the Interim Court of Arbitration. He has also acted as chairman of various Royal Commissions and Conciliation Boards, and was chairman of the Court of Inquiry into the Penistone electrical trades dispute.

Mr. H. Gosling is president of the National Transport Workers Federation, and a member of the London County Council.

Mr. G. H. Hume has been chairman of the Highways Committee of the London County Council.

Mr. W. F. Purdy is ex-chairman of the Labour Party and was one of the members of the National Industrial Conference. He is also assistant secretary of the Ship Constructors and Shipwrights' Association. He is a Justice of the Peace for Newcastle.

Sir Herbert Rowell is chairman of Messrs. R. and W. Hawthorn, Leslie and Company, Limited, and vice-chairman of the Federation of British Industries.

COURTS OF INQUIRY.

In view of the fact that there appears to be misunderstanding in some quarters on the subject of Courts of Inquiry, we may explain the position of such Courts under the Industrial Courts Act, 1919, in some detail.

The two principal permanent features of the Industrial Courts Act, 1919, are the provisions which

(*a*) Set up a permanent Court of Arbitration (termed the Industrial Court) to which recourse can be had by parties to industrial disputes, if both parties to the dispute consent. In this connection certain alternative methods of settling disputes are provided.

(*b*) Empower the Minister of Labour in case of disputes, whether apprehended or existing, to appoint a Court of Inquiry, one of the objects of which is to put before the public an impartial account of the merits of the dispute.

The Industrial Court is a permanent arbitration tribunal to which differences are referred for determination by consent of both sides. A Court of Inquiry is a body appointed by the Minister of Labour *ad hoc* to enquire into a particular dispute, irrespective of whether or not the dispute has been reported to the Minister. While, in appointing a Court, the Minister would, in accordance with the policy of the department, endeavour to secure the concurrence of both sides to that course, such consent is not necessary under the provisions of the Act. A Court of Inquiry consists of a Chairman and such other persons as the Minister may appoint, or the Court may consist of one person only.

Under the Conciliation Act, 1896, the Minister of Labour had power to cause an inquiry to be made into the facts and circumstances of a dispute, and this course was adopted in certain instances, of which perhaps the best known are—

(1) Inquiry by Sir Edward Clarke into the London Transport Workers' dispute, 1912.

(2) Inquiry by Lord (then Sir George) Askwith, Sir Thomas R. Ratcliffe-Ellis, and Mr. J. R. Clynes, M.P. into the Dublin Dockers' Dispute, 1913.

(3) Inquiry by Lord Askwith and other into the dispute at Woolwich Arsenal, June, 1914.

It was, however, in connection with the Canadian Industrial Disputes Investigation Act, 1907, that Courts of Inquiry became most prominent. This act required that any dispute arising in connection with certain kinds of disputes should be submitted to a Board of Conciliation and Investigation with a view to arriving at a settlement before a strike or lock-out could be legally brought about. The working of the Act was investigated by Lord Askwith in 1912 and, in his report, he stated that the simple purpose of the Act is to ensure the recognition of the interests of the public as a third party in trade disputes. He further stated that the forwarding of the spirit and intent of conciliation is the more valuable portion of the Canadian Act, and that an Act on such lines, even if the restrictive features which aim at delaying stoppage until after an inquiry were omitted, would be suitable and practicable in this country.

The provisions of the Industrial Courts Act in regard to the appointment of Courts of Inquiry are directly due to the recommendations of the Committee on the relations between employers and employed presided over by the Rt. Hon. J. H. Whitley, better known as the Whitley Committee. This Committee in the course of their inquiries gave consideration to the part which should be taken by the State in the event of those directly concerned in industry being unable to adjust their differences themselves. The Committee pointed out that the interests of the community may require that there should be an unbiassed and independent examination of facts and circumstances connected with any dispute between employers and employed, and they recommended—

> " Where the parties are unable to adjust their differences, we think that there should be means by which an independent inquiry may be made into facts and circumstances of the dispute and an authoritative announcement made thereon, although we do not think that there should be any *compulsory* power of delaying strikes and lock-outs."

Courts of Inquiry have been appointed under the Industrial Courts Act with successful results in the case of (1) Coal Trimmers, (2) Transport Workers.

Inquiry to be Opened on January 26.—A preliminary meeting of the Court of Inquiry was held at Montagu House, Whitehall, S.W., on Tuesday, January 11. Certain points of procedure were settled, and it was agreed that the inquiry should be held in public. The first public meeting of the Court will take place on Wednesday, January 26, at 10.30 a.m., when representatives of the trade union side will open the case.

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TIDAL POWER AND THE SEVERN SCHEME.

THIRD INTERIM REPORT ON WATER POWER RESOURCES.

There has now been issued the third interim report of the Water Power Resources Committee (appointed by the Board of Trade). This report deals solely with the question of utilising the power of the tides, and it treats in particular of schemes for the barrage of the estuary of the River Severn. Strangely enough there is no mention of the fact that the Ministry of Transport in the end of November last published a scheme in regard to the Severn. The report of the Committee was not issued till near the end of the year, but it is dated December 1. The scheme prepared by the engineering department of the Ministry of Transport was published on November 26. Whether the Committee were aware of the labours of the Ministry in the matter is not apparent, but the Minister (Sir E. Geddes) on November 30 stated that the Water Power Resources Committee were considering the subject. The Committee say they have examined two Severn schemes, one submitted by Mr. G. L. Addenbrooke, Mr. C. S. Meik, and Mr. J. W. Twinberrow, and the other by Mr. A. J. Liversedge. These engineers also gave evidence before the Committee. Two members of the latter also made a preliminary expert inquiry.

The remarks of the Committee on the general question of utilising the power of the tides as well as those regarding the Severn show how much has to be learned on the subject. The members of the Committee take a more tentative view of the possibilities of the Severn than did the report of the Ministry of Transport, and they want a thorough investigation by a body of technical experts. They sum up their views and recommendations as follow—

(1) The difficulties to be overcome in harnessing the tides are so bound up with local conditions, that it is essential that the general question of tidal power should be approached with reference to actual conditions obtaining at some particular locality.

(2) The technical information available in regard to the possibility of utilising the tides in the Severn for the generation of power is not sufficiently precise to enable us to express a final opinion on the schemes which have been brought before us.

(3) Preliminary estimates indicate, however, that if the Severn tides were used, energy could be generated and utilised at a favourable rate, and that the power obtainable throughout an industrial day of 10 hours would be of the order of 260,000 KW., and the consequent saving of coal would be from 1¼ to 2½ million tons annually.

(4) This energy, approximating to 1,000 million Board of Trade Units per annum, might be utilised by industrial organisations in the Midlands and South Wales, in railway electrification, and by undertakings established on the banks of the Severn near the site of the power development.

(5) It is probable that the development of any specific tidal power scheme of considerable magnitude, like that of the Severn, could be combined with proposals for improving transport and shipping facilities. In such a case the project should be investigated as a whole.

(6) Before a definite pronouncement can be made in regard to the commercial practicability of the proposals, therefore, a number of physiographical, engineering, commercial, industrial, and economic investigations require to be carried out.

(7) The prosecution of an inquiry of this character would require the close collaboration of experts skilled in the several branches of engineering and science involved, and the carrying out of experimental investigations and of certain hydrometric surveys.

(8) As an Inter-Departmental Committee, with very broad terms of reference, it would not be practicable for us to undertake such a prolonged and detailed inquiry. We consider it, however, to be of great importance to the inhabitants of the United Kingdom that the inquiry should be made.

We recommend that, in order to give effect to our conclusions—

(1) The Board of Trade, in consultation with the Minister of Transport, should set up a special Technical Commission, consisting mainly of expert engineers and persons of scientific attainments, to investigate the possibility, from a commercial standpoint, of utilising the tides for power purposes.

(2) The inquiry should be pursued with special reference to the Severn Estuary; the Commission should prepare a preliminary design and reasonably detailed estimates of cost of a tidal power scheme for that estuary, taking into consideration the desirability of making provision in it for road, railway, and shipping facilities suited to the requirements and possibilities of the adjoining district.

(3) The Commission should have regard to any interests likely to be detrimentally affected, and should consider and eport upon the steps which might be taken to prevent or mitigate injury to any interest.

THE GREAT HIGHLAND WATER POWER SCHEMES.

The magnitude of the two schemes for utilising water power in the Highlands of Scotland and converting it into electric energy is tersely indicated by the estimates of cost of construction which have been prepared by the engineers concerned for submission to Parliament along with the proposals. The estimated cost of the Grampian Electricity Supply Works is £4,060,000, while that of the Lochaber Water Power proposals is £2,962,000. The latter figure is divided into £2,872,317 for waterworks, £61,627 for a pier at Loch Linnhe, £4,272 for a road, and £23,784 for a deviation of the West Highland Railway. Both the Bills to be promoted propose the incorporation of new companies for the purpose, but the Lochaber scheme is associated with the British Aluminium Company, and no doubt it is intended that the electricity to be provided shall be mainly used in connection with works for the manufacture of aluminium. It may be recalled that the company have already a large water power in the district in use for aluminium manufacture. The Grampian proposals provide for a general electric supply in Perth, Kinross, and Forfar, and in parts of adjacent counties. Both schemes propose the utilising of the waters of mountain lochs and streams which are at a high level, and the construction of various dams, aqueducts, tunnels, and so forth, as well as the provision of electric generating stations, etc. Should the proposals bear fruit, they will be of enormous benefit to the Highlands. New industries may be expected, and the project of electrifying the Highland Railway might become more practicable.

OMNIBUS AND TRAMWAY LINKING.

A London Proposal.

At the meeting of the London County Council on December 14, the Parliamentary Committee reported on the Omnibus and Improvements Bill before the House of Lords, who had refused powers to the Council to run omnibuses.

Mr. M. J. Squires (chairman of the Highways Committee) said it was suggested by the Lords that the London General Omnibus Company should be asked to undertake the linking up of a number of the tramway termini. The company's manager said the decision would depend on certain questions, a reply to which was expected by the Highways Committee, when a report would be made.

Newcastle Transport and Electricity Committee.—The tramways committee of Newcastle Corporation, at its meeting on Thursday, December 30, considered that its designation as a tramways committee did not fully cover its sphere of operations, owing to the extended ramifications of the motor coach department and the electricity undertaking. The committee decided, therefore, that its designation shall henceforth be the Newcastle Transport and Electricity Committee.

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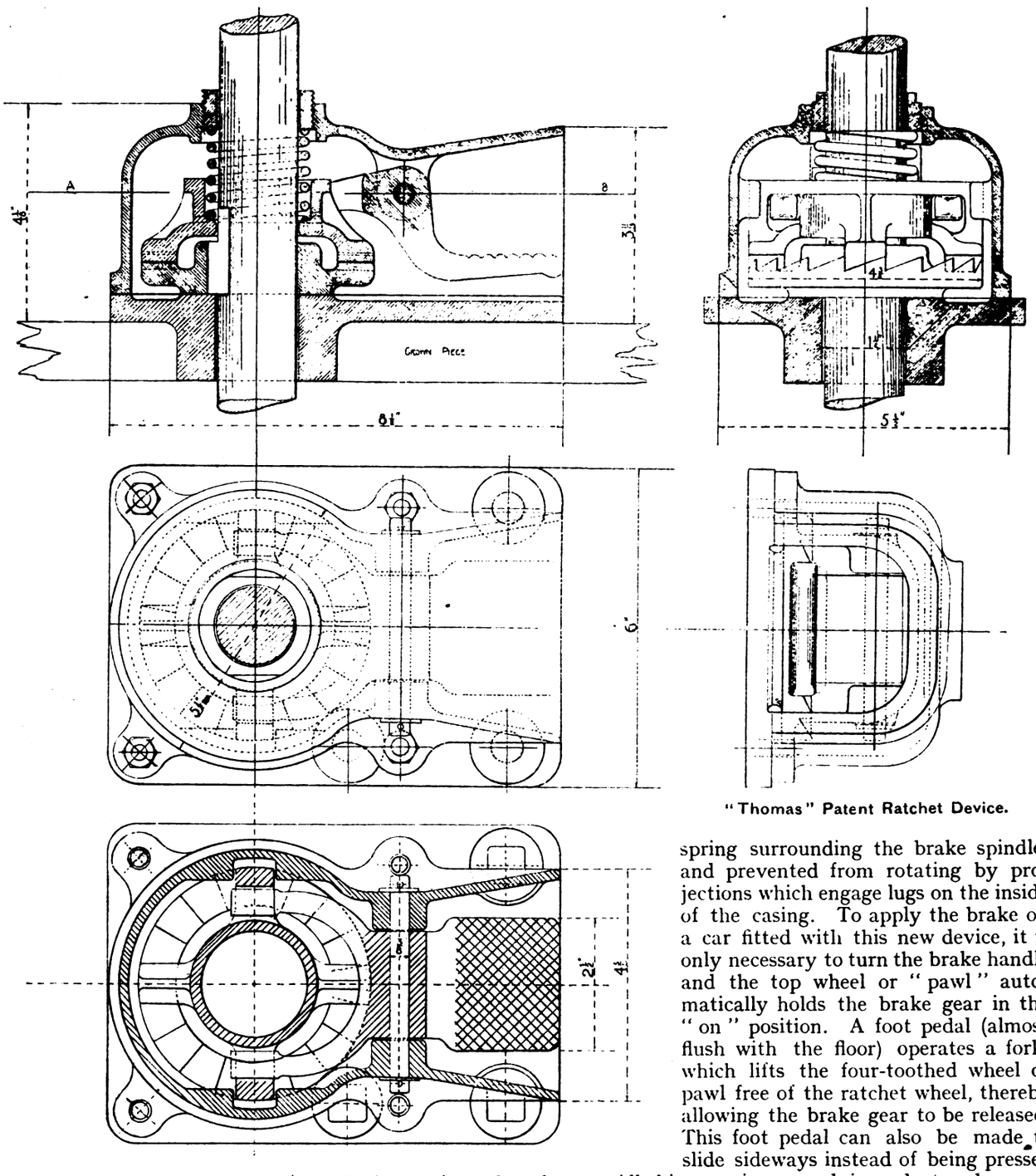
"THOMAS" PATENT RATCHET DEVICE.

One of the few important parts of equipment which have undergone no improvement since the horse-car days is the ratchet locking device at the bottom of the driver's brake handle. The original method of kicking a "dog" or "pawl" into gear with the ratchet wheel at the bottom of the brake spindle is still universally employed. A marked advance is made in a novel device patented by Mr. Sidney Thomas, managing director and engineer of the Peckham Truck and Engineering Company, Limited, of Audrey House, Ely Place, London, E.C.1 There are several designs incorporated in Mr. Thomas' patent, and the apparatus can be fitted to any car. The device has been thoroughly tested and found to be satisfactory in every way, and moreover, is greatly appreciated by the drivers. One type of this device is shown in the accompanying drawings. It consists of the usual ratchet wheel, keyed on to the brake spindle, but instead of the teeth being on the side or edge of the wheel as at present, they are on the top, and are of the "rack" type. Engaging in this wheel is a four-tooth dog-wheel or pawl, which is held in position by a coil spring surrounding the brake spindle, and prevented from rotating by projections which engage lugs on the inside of the casing. To apply the brake on a car fitted with this new device, it is only necessary to turn the brake handle and the top wheel or "pawl" automatically holds the brake gear in the "on" position. A foot pedal (almost flush with the floor) operates a fork, which lifts the four-toothed wheel or pawl free of the ratchet wheel, thereby allowing the brake gear to be released. This foot pedal can also be made to slide sideways instead of being pressed down. All this gear is encased in a dust-and-grease-tight box, which ensures protection from dirt. This fitting can be adapted to suit the double spindle type brake gear largely used on various tramways.



"Thomas" Patent Ratchet Device.

It is claimed that this brake ratchet enables the driver to apply his brakes more quickly and to "feel" the brakes better; thereby reducing the wear and cost of brake shoes and wheel tires, and also preventing

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skidding of wheels. In case of emergency the driver can devote his entire energies to applying the brake, without having to worry about engaging the ratchet dog and pawl with his foot, as at present. Since the ratchet wheel is held by four ratchet dogs or pawls instead of one, as at present, the risk of the brake gear being released through wear is reduced. The foot pedal is provided with a cover to prevent passengers treading on it, thus releasing the brake gear when the car is at rest. The ratchet device thus presents very marked advantages over the existing type and it is anticipated that it will be widely adopted for tramway hand brakes.

FINANCIAL REPORTS AND MEETINGS.

CROMPTON AND COMPANY, LIMITED.—An interim dividend at the rate of 7 per cent. per annum on the preference shares for the six months ended September 30 has been announced.

A.E.G. DIVIDEND.—The A.E.G. of Berlin have declared a dividend of 14 per cent. A year ago the rate was 10 per cent. The company has allocated 12 million marks to institutions for the benefit of the staff and workpeople.

GUEST, KEEN AND NETTLEFOLDS, LIMITED.—An interim dividend has been declared for the half year ended December 31, at the rate of 5 per cent. per annum on the first and second preference shares, and 1s. per share on the ordinary shares, both free of income tax.

MANX ELECTRIC RAILWAY COMPANY.—The gross receipts for the year ended September 30, 1920, amounted to £89,780, and the gross expenses to £48,870, leaving a gross profit of £40,910 as against £31,501 last year. After deducting the debit balance brought forward of £8,910 and debenture interest and sinking fund, there is a balance of £15,712. The payment of a dividend on the preference shares for the two years ended September 30, 1915, is recommended, carrying forward £1,390.

PROVINCIAL TRAMWAYS.—The directors of the Provincial Tramways Company recommend a final dividend of 10d. per share on the ordinary shares for the year ended September 30. This dividend makes a total distribution of 1s. 6d. per share (or 7½ per cent.) for the year. The sum of £10,000 is placed to reserve and depreciation account, and £10,000 is provided for excess profits duty. For the previous year the final dividend was the same, and a bonus of 6d. per share was paid, making 2s. per share (or 10 per cent.) for the year.

ANGLO-ARGENTINE TRAMWAYS.—At a meeting of the directors of the Anglo-Argentine Tramways Company, Limited, held on December 13, the following resolution was passed—"That the arrears of dividend for the 12 months to June 30, 1920, of 5s. 6d. per share, together with the current six months' dividend to December 31, 1920, of 2s. 9d. per share, less income tax at 6s. in the £ be and is hereby declared payable on December 31, 1920, to the 5½ per cent. cumulative first preference shareholders on the books of the company at December 21.

NATIONAL OMNIBUS AND TRANSPORT COMPANY, LIMITED.—The report for the year ended October 31, 1920, shows that the profit, after providing for depreciation of rolling stock, amounted to £20,103. Adding the balance of suspense account at October 31, 1920 (£10,671), and the amount brought forward (£1,327), there is a disposable balance of £32,101. A sum of £10,000 is to be transferred to depreciation of rolling stock account, and the directors recommend a dividend at the rate of 8 per cent. per annum, less income tax, leaving a balance of £7,681 to be carried forward. The report states that the provincial services have been developed and extended during the year, and all show satisfactory returns. The company now have depots at Chelmsford, Colchester, Clacton, Brentwood, Bedford, Yeovil, Stroud, and Taunton. Mr. Thomas Clarkson has resigned his seat on the board, and it is not proposed to fill the vacancy. The present directors are Mr. K. P. Hawksley, Lieut.-Colonel O. C. Clare, Mr. J. J. Jarvis, and Mr. W. J. Iden (managing).

LEEDS CITY TRAMWAYS DEFICIT.—The following statement shows the receipts and expenditure of the Leeds City Tramways for the period from October 28 to December 1 (35 days)—

Oct. 28—Dec. 1, 1920.	Totals.	Per car-mile.
Traffic and sundry revenue ...	£93,462	23·31d.
Expenditure	97,176	24·24d.
Deficit	3,714	·93d.

Average deficit per day, £106.

During the corresponding period of the previous year the traffic and sundry revenue amounted to £80,068, and the increase for the current eight months is thus £13,394. The number of tickets issued as compared with the corresponding period shows an increase of ·63 per cent.

For the first eight months of the current financial year (April 1 to December 1) the results are as follows—

April 1 to Dec. 1, 1920.	Aggregate.	Per car-mile.
Traffic and sundry revenue ...	£674,539	23·57d.
Expenditure	703,663	24·59d.
Deficit	29,124	1·02d.

Average deficit per day, £119.

The receipts for the corresponding period of last year were £602,003, thus showing an increase of £72,536 for the eight months.

NEWCASTLE CORPORATION TRAMWAYS.—In his report for the year ended March 25, 1920, Mr. Ernest Hatton, engineer and general manager of Newcastle Corporation transport and electricity undertaking, ment ons that during the year a considerable amount of overhead and repair work on cars and permanent way has been carried out, and owing to the high wages and heavy cost of materials it is doubtful if the income from the revised fares will meet the heavy demands upon the undertaking. Work upon the extension of the tramways across the high level bridge, for which Parliamentary sanction was obtained early in 1920, is in progress, and when completed it will be of very great service to the community, as it provides connection between the tramway systems of Newcastle Corporation and the Gateshead and District Tramways Company. A summary of the revenue account, with comparisons with previous years, is appended—

YEAR ENDED MARCH 31	1920	1919	1918	Last pre-war year 1913
	£	£	£	£
INCOME—				
Traffic revenue	479,215	451,163	409,114	228,091
Lighting (street and public buildings) ...	7,391	6,930	6,218	5,627
Advertising, etc.	3,316	2,878	2,696	4,487
Total revenue	489,922	460,971	418,028	238,205
EXPENDITURE—				
Traffic	225,827	172,338	130,260	64,494
General	31,630	25,106	20,446	18,674
Repairs and maintenance	94,631	66,159	62,379	25,944
Power expenses	46,977	34,109	27,648	15,508
Electricity for Newburn section	1,199	1,142	1,146	—
Lighting expenses	7,820	7,636	6,515	4,400
Working expenses	408,084	306,490	248,394	129,020
Gross profit	81,838	154,481	169,634	109,185
Bank interest	341	473	454	133
Interest (less tax) received on investments ...	8,937	6,477	6,424	3,833
	91,116	161,431	176,512	113,151
Interest on loans, etc.	21,335	22,857	25,844	30,431
Special rents, etc.	1,805	1,802	1,639	1,480
Income tax	23,095	20,428	17,785	3,179
Loss on sale of anchors, per City Engineer ...	—	745	—	—
Written off for depreciation of stores ...	322	59	—	—
Balance	44,559	115,540	131,244	78,061
BALANCE APPROPRIATED AS FOLLOWS—				
Sinking fund, etc.	41,781	40,614	39,985	39,556
Contribution to rates, etc.	1,374	15,385	15,428	13,461
Purchase of motor omnibuses	—	—	—	3,304
Appropriation for third party insurance ...	—	1,363	4,000	—
War allowances	—	13,178	16,831	—
Parliamentary expenses	—	—	—	551
Reserve and renewals fund	1,404	45,000	55,000	21,189

BUSINESS NOTICES.

VENNER TIME SWITCHES, LIMITED, have removed their works and offices to larger premises at 45, Horseferry Road, Westminster.

THE PECKHAM TRUCK AND ENGINEERING COMPANY, LIMITED, have removed to 26-29, Audrey House, Ely Place, Holborn, E.C.1.

ENGLISH ELECTRIC AND SIEMENS SUPPLIES, LIMITED.—The sales department of this company, and also of Messrs. Siemens Brothers and Company, Limited, formerly at Central House, New Street, Birmingham, have been removed to new premises at White House, 111, New Street, Birmingham. (Telephone—Midland 964. Telegrams—"Siemens, Birmingham.")

THE AUTO-TICKET PRINTING COMPANY, LIMITED, have removed to Laird Street, Birkenhead. The new premises have been secured with a view to eliminating the possibility of error in numbering tramway tickets without increasing the cost of production, and in furtherance of this object all manufacturing will be done on one floor. The new factory is entirely on the ground floor, and the machinery has been arranged in such a manner as to avoid unnecessary handling during the course of manufacture. Additional machinery has been installed so that the firm, which claims to have the most modern ticket-printing plant in the world, will be able to cope with the largest orders for tramway tickets in the shortest possible time.

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PERSONAL.

Mr. A. Muirhead has been appointed managing director of the South Indian Railway Company.

Lieut.-Colonel Eric Ball has been appointed a representative of the London County Council on the London Safety First Council.

Mr. Robert T. Todd has been appointed an O.B.E. for special services during the war in connection with the British Aluminium factory at Kinlochleven.

Halifax Tramways Committee has confirmed the appointment of **Mr. J. W. Galloway,** tramways engineer, as general manager for one year, at a salary of £700.

Alderman Varwell has resigned from the Exeter Tramways Committee, owing to ill-health, and the committee has placed on record their appreciation of his valuable services.

Mr. H. Webber, borough electrical engineer of Keighley, has been granted an increase in salary to £750 per annum from the date at which he relinquished the position of tramways manager.

Mr. John Ames, general secretary of the Industrial League and Council, has been appointed a member of the commercial panel for the Appointments Department of the Ministry of Labour.

Mr. W. R. Spaven, general manager of the Portsmouth Corporation Tramways, has been granted an increase in salary from £800 to £1,000 per annum, and **Mr. V. G. Lironi,** engineer, from £690 to £880.

Mr. Stanley Clegg, borough electrical engineer and tramways manager of Lincoln Corporation, has been appointed engineer of the motor omnibus service which the Corporation established recently.

Mr. N. J. Young, general manager of the Newport Corporation Tramways, has been appointed as employers' representative on the Welsh National Joint Industrial Council in succession to Sir John Courtis.

Mr. J. A. Bromley, whose appointment as manager of the Keighley Corporation tramway and trackless trolley undertakings was mentioned in our issue of November 27, is to receive a salary of £400 per annum.

Mr. T. A. McCrea, who has been connected for many years with oil and spirit distribution, has been appointed assistant manager of the motor department of C. C. Wakefield and Company, Limited, manufacturers of castrol lubricants.

Mr. A. H. Darker, chief engineer and manager of the electrical department of J. Stone and Company, Limited, has returned to London after an absence of nearly three years, during which time he has made a business tour round the world.

Mr. Edward Steer, who has been appointed chairman of Guest, Keen and Nettlefold, Limited, has been connected with the firm for over half a century, and since 1917 has been joint deputy chairman and joint managing director with Mr. Francis Keen.

Mr. C. T. Jewell has been appointed general manager to the Norwich Electric Tramways Company and has consequently resigned his position as engineer to the Yorkshire (West Riding) Electric Tramways Company. He took up his new position on January 3.

Mr. A. Forster, tramways works manager at Stockton-on-Tees, who has been appointed general manager of the Stockton-on-Tees section of the route under the two Corporations, has been presented by the employees with a silver rose bowl, with a pair of vases for Mrs. Forster.

Mr. A. E. Wood, works superintendent of Southampton Corporation Tramways, has been appointed assistant repair depot superintendent of the London County Council Tramways Department. The remuneration, with present allowances, will be £573, rising to £727 a year.

Sir Charles Petrie, who died on July 8, left estate of the gross value of £59,260. He was vice-president of the Tramways and Light Railways Association, and a director of the Singapore Electric Tramways, Limited. Formerly for some years he was chairman of the Liverpool Corporation Tramways Committee.

Captain W. H. Upton Marshall, R.E. (T.), M.I.E.E., M.I.Mech.E., after having been on war service for five years, has re-opened his practice (with offices at 2, King's Terrace, Portsmouth) as consulting electrical and mechanical engineer, and also as inspecting engineer. He will be glad to receive catalogues and price lists of electrical plant, cables, steam plant, oil engines, etc.

Messrs. Kincaid, Waller, Manville and Dawson, consulting engineers, have been reinstated in their former offices at St. Stephen's House, Victoria Embankment, Westminster, S.W.1, the Government having released the premises. The firm announce that they have taken into partnership Mr. A. E. Jackson, M.Inst.E.E., and Mr. H. G. Simmonds, who have been intimately associated with them as their principal assistants for many years. There will be no alteration in the title of the firm.

Mr. and Mrs. Peter Fisher were the recipients of gifts at an assembly, at the Dundee Guildhall on December 9, at which all grades of tramway workers were represented. Mr. Fisher, who recently resigned the position of general manager of the tramways, with which he has been associated for 33 years, was presented with a sporting rifle and a wallet of Treasury notes and Mrs. Fisher received a gold chain and locket. Mr. A. Malcolm, convener of the Tramways Committee presided, and Lord Provost Spence made the presentation.

Mr. Arthur Watson has been appointed general manager of the London and North Western Railway in succession to Sir T. Williamson, who retired on December 31. Mr. Watson is at present general manager of the Lancashire and Yorkshire Railway, and by agreement with the directors of that company he continues to occupy that position. The new appointment of Mr. Watson is regarded as being the first step towards carrying into effect the railway grouping proposals. Two schemes have been put forward, one by the Ministry of Transport and the other by the Railway Companies' Association, and in both of these the London and North Western and the Lancashire and Yorkshire Railways are placed in the same group. Under the Ministry of Transport's scheme in addition to these two systems the Midland, the North Staffordshire and the Furness Railways will be included in one group, while in the plan of the companies the group would include in addition to these the Glasgow and South Western and the Highland Railways.

We regret to record the death of **Mr. P. H. Thomas, I.S.O.,** late of the Board of Trade. Prior to his retirement in 1914, Mr. Thomas for many years dealt with tramway and light railway work at the Board of Trade, and was well known to tramway managers throughout the country.

NEW YEAR'S HONOURS.

The undermentioned honours have been conferred by H.M. the King—

PEERAGE.—Sir William Beardmore, Chairman and Managing Director of William Beardmore and Company, Limited.

ORDER OF THE INDIAN EMPIRE—C.I.E.—Arthur Charles Rumboll, O.B.E., Acting Agent, Great Indian Peninsula Railway.

ORDER OF THE BATH—C.B. (Civil).—Col. John Wallace Pringle, Chief Inspecting Officer of Railways, Ministry of Transport.

PRIVY COUNCILLOR.—Alderman Sir Andrew Beattie, D.L., Chairman of the Provincial Tramways Company, and subsidiary companies.

BARONET.—Mr. Albert Edward Bowen, Chairman of the Buenos Ayres Great Southern Railway and the Buenos Ayres Western Railway.

KNIGHTS.—Thomas Jewell Bennett, M.P. for Seven Oaks Division, Director of the Bombay, Baroda and Central India Railway; William Peter Rylands, President of the Federation of British Industries; Ernest Fitzjohn Oldham, Deputy Chairman of the Federation of British Industries; Henry Vernon Kilvert, Director of the Lancashire Dynamo and Motor Company.

CONTRACTS AND ORDERS.

Leeds Electricity Committee have accepted the tender of W. T. Henley's Telegraph Works Company for the supply of cables at £2,783.

The Metropolitan-Vickers Electrical Company, Limited, have an order from Doncaster Corporation for a 750 KW. rotary converter at £6,528.

Eighteen tenders have been received by Aberdeen Town Council for five chassis required for the proposed motor omnibus service for Menzies Road. **John I. Thornycroft and Company, Limited,** were the successful tenderers, the price being £1,083 for each chassis, making a total of £5,415.

The Albion Motor Car Company have just received an order through their South Wales agents, R. E. Jones, Limited, from the Neath Council for eight 30 cwt. tipping wagons. A repeat order has also been received from the Union Petroleum Products Company for eight 60 cwt. chassis. When these have been delivered this company will have a total of 67 Albion vehicles.

J. W. Courtenay, Limited, of Amberley House, Norfolk Street, London, W.C., have been appointed advertising contractors for Birmingham Corporation motor omnibuses, of which the Tramways Department now operate 40. The same firm have been advertisement contractors for the Corporation's tramways for many years. Other Corporations that have recently placed their tramway advertising concessions with J. W. Courtenay, Limited, inclu Croydon and Maidstone.

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TRAMWAY AND LIGHT RAILWAY NOTES.

ASHTON.

ARBITRATION COSTS.

The recent arbitration proceedings in connection with the purchase of Oldham, Ashton, and Hyde tramway undertaking involved an expenditure by Ashton Corporation of £2,142 11s. 3d., of which over £1,700 was paid to counsel. The tramway company is appealing against the arbitrator's decision, and further costs will thus be incurred.

ABERDEEN.

A QUESTION OF THROUGH RUNNING.

At a meeting of the Aberdeen Tramways Committee on December 28, Mr. D. W. Beaton presiding, a sub-committee reported that they had failed to come to terms with the Aberdeen Suburban Tramways Company for the continuation of the agreement for through running. It was decided that notice should be given to the Suburban Company to terminate the agreement next June. At present the company are allowed to run their cars over the Corporation's tramway track through the city. Under a clause of the agreement the Corporation claim the money paid by passengers on the suburban cars within the city area, and in return the Corporation make certain allowances to the company. It was on the question of these terms that the negotiations broke down. It is understood that the company will present their case to the Minister of Transport, with whom the final decision will rest.

ACCRINGTON.

CARELESS LORRY DRIVING—INCREASED COST OF TRAMWAY CARS.

That plaintiff was taking an unnecessary risk in attempting to cross the road with a motor lorry in front of a tramcar thirty yards away was the conclusion of the Judge who heard the claim, in the Accrington County Court, of Messrs. Pickering Brothers, of Blackburn, who sued the Accrington Corporation for £100 damages for the alleged negligent driving of a tramcar. The Corporation put in a counterclaim for £91 6s. 5d. for alleged damage to a tramcar. One of the plaintiffs was driving a motor lorry and was turning into a side road when the lorry was struck by the tramcar. Judgment was given for defendants. The contracts for four new tramway cars placed by Accrington Corporation are to be increased by £426, owing to the increased cost of labour.

BELFAST.

NEW CARS—PROPOSED INCREASE OF FARES.

The trial run of two new tramcars which have arrived in Belfast was the occasion of some ceremony on December 22. The High Sheriff (Councillor W. G. Turner), in his capacity as chairman of the tramways committee, acted as motorman of the first car, and the passengers included the Lord Mayor (Councillor W. F. Coates, J.P.) and members of the City Council, whilst Mr. J. S. D. Moffet, general manager of the tramways, was amongst the officials present. Fifty new cars have been ordered, the cost of each being approximately £3,000, and the committee hope to put them into service at the rate of two per week. The bodies and trucks of the new cars, which have totally enclosed upper decks and seat 68 passengers, have been constructed by the Brush Electrical Engineering Company, Limited. The electrical equipment has been supplied by the English Electric Company, Limited. The general manager, in a report to the tramways committee, has stated that the fare scheme that they were asking the Ministry of Transport to sanction was based on the principle of giving, as near as possible, having due regard to suitable stopping points, a ride of one mile for 1d., with a minimum fare of 1½d. Should the anticipated revenue resulting from the increased minimum fare not prove sufficient to meet the increased expenditure, the next step would be to increase the minimum fare to 2d., and other fares by 1d., leaving the stages untouched. It is not necessarily the intention to put the maximum fare in force at once, but to obtain a certain amount of latitude to raise the fares by two or more instalments if it be found necessary.

BRADFORD.

SMART PARCELS DELIVERY SERVICE—ALLOCATION OF MUNICIPAL TRAMWAY PROFITS.

A report of the Corporation tramways committee states that the inter-town traffic between Bradford, Leeds, Halifax, and the heavy woollen district has grown considerably, due very largely to the much smarter delivery which is given by tramway as compared with that given by the railway companies. The number of parcels handled in this connection last year was 81,885. Parcels for Leeds are being carried to that city by the railless battery vehicle, which is admirably adapted for the work. At a meeting of the Bradford City Council on December 13, a resolution was read from the Society of Locomotive Engineers and Firemen to the effect that they objected to tramway profits being used for the purpose of the relief of rates. In their opinion the profits should be used for the purpose of reducing fares and for the extension of the tramway system. The communication was referred to the tramways committee.

BLACKBURN.

DEPOT EXTENSIONS.

Six acres of land adjoining the depot at Intack have been purchased by the Blackburn Corporation for £3,900 for the purposes of extensions.

BLACKPOOL.

TRAMWAY DEPOT EXTENSION.

Blackpool Corporation has applied to the Ministry of Health for sanction to borrow £18,000 for alterations at the Corporation's Rugby Road depot in connection with the provision of new buildings. The Corporation having recently acquired the Blackpool and Fleetwood tramroad undertaking, more accommodation is required for cars and engineering work.

BRIGHTON.

RE-GRADING APPLICATION—EFFECT OF HIGH FARE.

It was reported at a meeting of the Town Council that the Standing Committee of the National Joint Industrial Council for the tramway industry have considered the employees' application for a re-grading of the undertaking. After hearing both sides, the chairman announced that no decision had been reached. Traffic returns on the Brighton Corporation Tramways for the first week under the charge of double fares showed a falling-off of nearly 100,000 passengers, but the receipts increased by £154. The deputy town clerk recently stated that there was a prospect of the tramways "coming upon the rates" to the extent of £20,000.

BRISTOL.

WORKMEN'S TICKETS EXTENDED.

Workmen's tickets on the Bristol tramway service are now available for return at any time during the day. The concession dates from December 16. Previously only cars after noon could be utilised by passengers for the use of the return half.

BURNLEY.

APPLICATION TO INCREASE FARES.

During the six months ending September 30 the deficit on the Burnley tramways undertaking has amounted to £10,000. It has been decided to apply for power to increase the fares by 50 per cent.

CORK.

TRAMWAY CASHIER ROBBED.

As the cashier of the Cork Tramway Company was returning from the bank with £600 to pay the employees' weekly wages he was held up by two armed men who seized the money and quickly disappeared.

DUNDEE.

FREE PASSES ON THE TRAMWAYS.

From a statement prepared by the tramway manager it appears that there are 454 free passes over the system. Of these 280 are held by blind people, 147 by disabled soldiers, 22 by nurses, and 5 by Corporation officials. In addition there are 32 passes held by Corporation officials at £6 6s. each, and 5 (recently issued) at £9 9s. The market value of a free pass over the system is put at £20 per annum, and it is estimated that if full payment were made for all the passes this would represent an annual revenue to the department of £9,820. While there is no suggestion that any of the passes should be abolished—certainly not those granted to the maimed and the blind—it is true that the tramway department is bearing the whole cost, and the suggestion is made more with a view of finding out whether it would be possible for other departments to participate in the cost. The issue of free passes to Town Councillors is suggested.

EDINBURGH.

DISMISSAL OF STRIKERS—ELECTRIFICATION.

The Town Council at their meeting on December 22 had before them the report of the tramway company with regard to the settlement of the recent strike, and their recommendations of approval of the dismissal of employees. There were circulated among the members of the Town Council copies of a report by Mr. J. Veitch, the Scottish divisional representative of the Tramway Section of the United Vehicle Workers' Association, asking for further consideration, with a view to the reinstatement of the 21 men dismissed. Mr. W. R. Sleigh, convener of the tramway committee, said since the Corporation took over the undertaking the working conditions of the employees had been vastly improved. Any strike against the community could only have one end. The rule imposed by the men was an attempt openly to defy the committee and the management and to control the undertaking. The committee were of opinion that the men dismissed could not be reinstated. The committee's action was approved by 46 votes to 4. The tramways committee has decided further to consider details of the estimates of the cost of electrifying various routes before proceeding with the conversion of the Pilrig-Nether Liberton route.

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EXETER

INCREASED COST OF TRAMCARS.

The revised tender for two new tramcars for the Exeter Corporation is £1,685 each—£135 in excess of the original tender. The quotation for two sets of electrical equipment is £870 per set, against an original tender of £725. The increased cost of the two cars is thus £560.

GLASGOW.

MEN'S DEMANDS—TRAFFIC CONGESTION—REQUEST FOR ALL-NIGHT CARS.

The tramway drivers who are members of the United Vehicle Workers' Union have applied to the Glasgow Tramways Committee to have the bonus of £2 12s. per annum paid to motormen for the avoidance of accidents increased to £5 4s. The tramways committee, by 20 votes to 13, recommended that the application be refused. The bonus at present costs the department about £4,000 a year. The increase would cost over £4,000. Both the United Vehicle Workers and the National Amalgamated Workers' Union have applied to obtain overalls and clogs, free of charge, for the workers employed as cleaners and repairers, greasers and repairers. A report is being prepared on this question by the general manager. A special sub-committee of the tramways committee of Glasgow Corporation considered on December 22 the questions of traffic congestion and the provision of increased facilities for travelling in the city. It was agreed to express the opinion that the first step should be the erection of a bridge across the Clyde at Oswald Street and the construction of a tramway line from Cowcaddens down Hope Street and Oswald Street to the bridge. Parliamentary powers for both these undertakings were granted under the Corporation Act of 1914. At that time the cost of the work was approximately £136,000. At present rates the bridge and tramway lines, it is understood, would involve an expenditure of fully £400,000.

HALIFAX.

TRACK SUPERVISION.

The Tramways Committee have decided to ask the Town Council to approve of the committee's assuming full control of the tramway track construction and maintenance. At present part of the track is under the control of the Highways Committee and there is much overlapping.

HASTINGS.

TRAMWAY EXTENSIONS.

The Hastings Tramways Company proposes to extend its system along the sea front, and for this purpose has deposited a Bill for introduction into Parliament next session. Under the Hastings Tramway Act of the present session the company was placed under a statutory obligation to extend its system from the Memorial to the Fish Market in the event of the Corporation requesting the company to do so. This request the Corporation has made. The Bill therefore proposes to authorise the company to extend its system, with a junction at the Memorial, to enable through cars to run along the sea front from the Fish Market to Bexhill and Cooden Beach. No new capital is proposed to be created.

HUDDERSFIELD.

WIRELESS FOR TRAMWAY OFFICES—EXTENSION OF HOURS FOR WORKMEN'S FARES.

A wireless apparatus is to be installed in the Huddersfield tramway offices with a view to perfecting the present arrangements for securing the standard time at the offices. The installation will pick up every morning the standard time given out to the world from Eiffel Tower, Paris. The apparatus will be made by the tramways staff, and it has been designed by the son of the manager (Mr. A. A. Blackburn). The new system is designed to reduce considerably the margin of possible error contained in the present system, and it is believed that Huddersfield will be the first municipality in the country to be able to guarantee the Eiffel Tower standard time. The installation (says the *Huddersfield Examiner*) will further possess a somewhat unique feature in that the "aerials," in fact the whole of the wireless apparatus, will be inside and not outside the building. The tramways committee are considering the advisability of extending up to 9 a.m. the hours for the purchase of workmen's tickets. Unemployment and the short hours at present being worked are two of the grounds for the request that the matter should be considered.

KIRKCALDY.

APPLICATION TO INCREASE FARES.

The Town Council has decided to ask the Ministry of Transport for power to increase the statutory fares on its tramway undertaking.

LANCASTER.

POWER DIFFICULTIES.

The tramway service has been suspended for two hours daily, except on Wednesdays and Saturdays, owing to a breakdown at the Lancaster electricity works. It is expected that several months will elapse before the service can be fully restored.

LEEDS.

INCREASED PARCEL CHARGES—CHRISTMAS SERVICE.

Leeds Corporation Tramways have decided to increase the charges for the carriage of parcels exceeding 14 lb., but not exceeding 28 lb., from 6d. to 7d., and from 8d. to 9d. for parcels over 28 lb., but not exceeding 56 lb. Leeds tramway men worked as usual on Christmas Day. A service was run corresponding approximately to that given on Sunday, and the men who were called upon to run the cars received double pay.

LIVERPOOL.

DEFICITS—REVISED FARES—FAST TRACK SCHEME ABANDONED—WAR MEMORIAL.

It was stated at a meeting of the tramways committee that on the present fares every motor omnibus route in the city was losing money at the rate of more than one shilling per car-mile. The chairman (Mr. Frank C. Wilson) said both tramcars and omnibuses were being run at a heavy loss. A special meeting of the committee was held to consider the question of fares and stages, and to recommend a new scale of fares to the City Council. This will mean increases in some cases, while on certain routes there will be an exceptionally good ride for the fare charged. Mr. F. C. Wilson, chairman of the tramways committee, states that the new fares will bring in only sufficient money to cover operating expenses, with a very small surplus that would be swallowed up in the cost of renewals. The long distance rider will get the benefit of the new scale, and the fares between the Pierhead and the new housing areas will be as low as at present, in some cases lower. The fare from Garston to the Pierhead, for instance, is 4d. now; in the new scale it will be a 3d. fare. The tramways committee has recommended the City Council to rescind the previous resolution authorising the Princes Road tramway scheme under which it was decided to reconstruct the tramway track alongside the boulevards instead of in the centre of the road so as to facilitate a fast service of cars. Since the scheme was mooted considerable opposition has been expressed on financial grounds. Designs are being submitted to the tramways committee for a memorial to be erected at the tramways office bearing the names of all employees in the tramways and electric supply departments who were killed while serving with the forces. The committee are also making arrangements for a memorial tablet to be erected at each city tramway depot bearing the names of those tramway employees who fell in the war.

MANCHESTER.

COLLISIONS—EMPLOYEES' DEMAND DISAPPROVED BY EXECUTIVE.

At an inquest at Manchester on the driver of a motor lorry which collided with a tramcar, four witnesses declared that the tramcar did not come to a standstill at the compulsory stopping-place at the corner of Parkfield Street. This was denied by the driver of the car and a trolley boy, but the coroner, in entering a verdict of accidental death, warned the driver that he must be most careful in future, and added that it would be much safer if tramcar drivers in general came to a standstill a little before reaching the corners of streets marked as compulsory stopping points. A collision between tramcars occurred at the junction of Piccadilly and Mosley Street, Manchester, on December 24. A Conran Street tramcar proceeding towards Market Street jumped the points which turn into Mosley Street, and another car approaching from the other direction collided with the first vehicle. The Conran Street vehicle was badly damaged about the front and the higher deck, and the driver, Herbert Goodier, of 17, Turner Street, Higher Broughton, was removed to the Roby Street branch of the Royal Infirmary suffering from injuries to the ribs. After attention there he was allowed to go home. A passenger who was sitting inside the car near the driver's platform was severely shaken. Breakdown gangs were at work for nearly two hours endeavouring to place the derelict car on the metals again. The network of points at the corner made the task of the men very difficult indeed. The National Executive Council of the United Vehicle Workers' Union has refused to sanction the application of the Manchester and Salford tramway men to put in a claim for an increase of wages of £1 a week. The decision was communicated to a meeting of representatives of the Manchester men's branches on December 22, when it was decided that any further action should be deferred till after the national inquiry. The Executive Council's decision was conveyed in the following resolution—"That having carefully considered the application of the Manchester and Salford branches, and the views put forward by the delegation for the purpose of making a local application for an increase of wages, the E.C. are of opinion that such an application would be fruitless, and would have a detrimental effect on the forthcoming inquiry."

MUSSELBURGH.

SHORTAGE OF POWER.

Musselburgh Tramways Company, having asked for a supply of electric power from Edinburgh Electricity Committee, the latter have replied that the Corporation could not grant the request owing to the present demands on the city's electric supply.

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NEWCASTLE.

SALARIES INCREASED—MEMORIAL SERVICE.

The new Civil Service scale of war bonuses, which some time ago was granted to the staff of the Newcastle City Council, has been extended to the tramways department. This confers bonuses varying according to staff grades. The general manager's remuneration will be increased from £1,600 to £1,750, while the assistant electrical engineer, the assistant mechanical engineer, the rolling stock superintendent, the chief clerk, the accountant, and the traffic superintendent will also receive an increase of £150 per annum.

NEWPORT.

HIGHER FARES.

A report has been submitted to the Newport (Mon.) Tramways Committee showing a net loss on the working of the tramways up to date for the year of £1,000, with another £9,000 on renewal of track, making a total of £10,000. It is stated that the renewals have been largely discontinued on the score of costliness. On the recommendation of the Tramways Committee, the Corporation have decided to apply to the Board of Trade to sanction a further increase of fares by 50 per cent. In reply to a criticism of the proposal, Alderman J. Moxon, chairman of the tramways committee, said they must have another £10,000 a year to meet their obligations.

NOTTINGHAM.

NO PROFIT.

When a request for the reintroduction of a penny tramcar fare was made at a meeting of the Nottingham Town Council, Mr. J. Clarkson replied that the tramway committee had not even considered the matter. After eight months' running of the tramways this year, not a penny profit had been made.

PONTYPRIDD.

SUNDAY TRAMCAR PLEBISCITE.

A plebiscite of the electors is being taken at Pontypridd on the question of running the tramcars on Sunday. No cars are at present run on Sundays in the Council's area. At a meeting of the Pontypridd Council a letter was read from Mr. Holliday, general manager of the Rhondda Tramways Company, with whom the Pontypridd Council have a through-running arrangement, suggesting that a Sunday service of cars should be run between Pontypridd and Trehafod to link up with the Rhondda track, on which there is at present a Sunday service. Mr. Holliday suggested that if the Pontypridd Council were not prepared to run their own cars on Sunday they should allow the Rhondda company to run a Sunday service to Mill Street, Pontypridd, the Rhondda company to pay over to the Pontypridd Council the net revenue after payment of working costs. He estimated that under such an agreement the Pontypridd Council would secure a revenue of at least £700 per annum, without incurring a single penny expenditure. The taking of a plebiscite was then agreed upon.

ROTHERHAM.

BILL FOR NEW POWERS.

The Rotherham Corporation propose to ask for Parliamentary powers to increase the weight of trolley vehicles, to run motor omnibuses on several routes, and to impose conditions as to the use of omnibuses.

SHEFFIELD.

MOTOR FOR LORD MAYOR—MANAGER'S STATEMENT ON EXPENSES PROPOSED CIRCULAR TRAMWAY.

The Lord Mayor's Advisory Committee of Sheffield Corporation has recommended that the tramways department should provide the Lord Mayor with a motor car, a driver, and garage accommodation. Alderman Wardley was elected in November as the first Labour Lord Mayor of Sheffield. Mr. A. R. Fearnley, general manager of the Sheffield tramways, addressing the Comrades of the Great War in the city, said that out of every 20s. received by the city tramways during the past six months wages had taken 10s. 2d., salaries 3½d., electrical energy 2s. 4½d., materials 1s. 11¼d., renewals 1s. 3⅜d., interest and sinking fund, 2s. 4¼d., local rates 4⅜d., income-tax 6¼d., and miscellaneous expenditure 7⅜d. These items came to exactly 20s., so that the balance available from the receipts for disposal was *nil*. Sheffield is to spend £60,000 in constructing a road that will encircle the city and provide work on the first two miles for 600 men. The road will be 120 ft. wide, and will allow for a double tramway track.

SUNDERLAND.

WORKMEN'S FARES ABOLISHED.

The proposal, made by Ald. George New, that workmen's fares should be abolished on the Sunderland tramways, has been carried. When he made the proposal he read to the Council a set of figures interesting to everyone who takes an interest in the question of wages. In 1914, he said, shipyard labourers earned £1 5s. a week, but to-day the figure has increased to £3 12s. Engine-shop labourers in 1914 were half-a-crown behind them, but to-day have the same figure. Grocers' assistants got £1 10s. a week six years ago, and to-day they have £3 15s. Joiners had £2 1s. 8d., contrasted with £5 6s. 4d.; fitters £1 17s., whereas to-day the figure is £4 8s. 3d. The average increase in the wages of skilled shipyard labourers is 131·59 per cent.

WALLASEY.

NEW MINIMUM FARE.

Wallasey has now a minimum tramway fare of 1½d. It is estimated that the advance from 1d. will produce an additional revenue of £30,000. The average distance of the three halfpenny stages is 2,000 yards.

WALSALL.

NEW CARS.

Walsall Tramway Committee recommend the Corporation to apply for sanction to the borrowing of a sum of £22,558 to defray the cost of purchasing 10 new tramcars for the town.

YORK.

TACKLING THE YORK DEFICIENCY—NEW RAILLESS ROUTE.

The York Tramways Committee report that at the existing rate of income and expenditure there will be a deficiency of approximately £10,000 at the end of this financial year. In order to reduce the deficit and make income equal the expenditure, and cover all interest and sinking fund charges, the committee recommended the Council to adopt a charge of 2d., the dinner-hour tickets to apply only to persons in the Health Insurance limits, and children and scholars to be charged one penny. The recommendation was adopted by the Council, and has been put into operation. There are now only two kinds of tickets—a through ticket and a transfer ticket—and the only transfer station is at the railway station. The new railless service from Parliament Street, in the centre of York, to Stockton Lane, in the Heworth suburb, was put into operation on December 22. The route will serve a popular suburb at Heworth, where the City Corporation has laid out a housing scheme which is now in course of building.

PATENT LIST

Abstracted for "The Tramway and Railway World" from the Official Journal of Patents.

***** If the inventions have been communicated the names of the communicators are given in italics.**

APPLICATIONS FOR LETTERS PATENT.

The number of the patent is given in brackets.

SPECIFICATIONS PUBLISHED

Change speed gear for motor vehicles (34,188)—D. C. Black.
Emergency brakes for heavy road vehicles (34,153)—W. A. Danter.
Tramcars and omnibuses (33,869)—J. A. Davenport.
Brakes for motor vehicles (34,000)—R. H. Davis.
Motor vehicle emergency brake (33,707)—J. B. Gayler and A. W. Gilbert.
Direction indicator for motor vehicles (34,304)—A. and S. Horton.
Means for actuating brakes of power vehicles (33,610)—J. Hulme.
Variable speed gear for motor vehicles (34,335)—H. Keitel.
Front life guard for motor vehicles (34,089)—J. H. and W. H. Lloyd.
Automatic couplings for tramway vehicles (34,254)—A. L. McColl.
Direction indicator for motor vehicles (34,246)—J. H. Russ.
Friction transmission gearing for motor vehicles (33,634)—N. Rycroft.
Brakes for motor vehicles (34,000)—W. H. Scott.
Life guard for motor vehicles (33,746)—T. R. Stavers.
Driving gear of motor vehicles (34,280)—W. J. Stott.
Adjustable tram rails (34,165)—C. E. Wraight.
Rear axle casing for power vehicles (34,665)—Argus Motoren-Ges.
Ball joints for rear axle bridges of power vehicles (34,666)—Argus Motoren-Ges.

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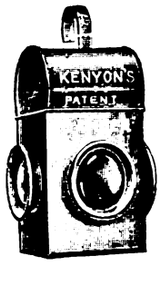

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Operating mechanism for speed gear, clutch, and brakes of power vehicles (34,667)—Argus Motoren-Ges.
Brake and switch attachment for mechanically propelled vehicles (34,446)—T. A. Carter.
Axles of motor vehicles (34,893)—T. Clarkson.
Pumps for delivering fuel to engines of motor vehicles (34,721)—P. and R. Fisch.
Traffic guides or signs (34,947)—E. Gibbon and A. E. Johns.
Brakes for automobiles, etc. (34,591)—C. F. Halsall.
Transmission mechanism for motor vehicles (34,393)—A. C. Hess.
Transmission and brake mechanism of power-propelled road vehicles (34,744)—F. W. Lanchester.
System of distant control for regulating devices of electric vehicles (34,574)—Maschinenfabrik Oerlikon.
Steering axles for road vehicles (34,911)—A. J. R. Napier.
Brakes for power-driven vehicles (34,434)—Oesterreichische Daimler-Motoren-Akt.-Ges.
Internal combustion driving unit for motor vehicles (34,580)—H. P Saunderson.
Motor vehicles (34,871)—A. N. Shorter.
Steering apparatus for motor vehicles (34,403)—S. Sullivan.
Springing of motor lorries, etc. (34,404)—S. Sullivan.
Sleeper and chairs for tramway rails (35,157)—J. Barrett.
Tire presses (35,201)—Dunlop Rubber Company (*Dunlop Tyre and Rubber Goods Company*).
Safety controlling gear for electrically propelled vehicles—R. Garrett and Sons and A. J. Serve.
Covers for top deck passengers on omnibuses (35,267)—H. H. Hancock.
Lifting jacks (35,428)—F. Ilsemann and Metall-Industrie und Handels Ges.
Method of operating guides and trolley pole wheels for tramcars, etc. (35,156)—T. Main.
Braking devices for motor trucks (36,223)—A. E. Alexander (*Three Point Truck Corporation*).
Motor vehicles (36,224, 36,225, and 36,227)—A. E. Alexander (*Three Point Truck Corporation*).
Driving axles for motor vehicles (36,226)—A. E. Alexander (*Three Point Truck Corporation*).
Steering devices for motor vehicles (35,725)—M. J. B. Barbarou.
Track brakes (35,942)—E. Frolich.
Motor vehicles (36,163)—E. S. Hall.
Tramcars and omnibuses (35,652)—A. G. Kerslake.
Trolleys for electric tramways of the overhead conductor system (35,891)—W. Lawrance.
Motor vehicles (36,123)—H. P. Martin.
Indicators for road vehicles (35,878 and 35,879)—C. Pearson.
Direction indicator and screen cleaning device for motor vehicles (36,366)—B. C. Clark.
Seats of omnibuses, etc. (36,545)—J. W. Cross.
Rail joints (36,586)—J. Nelson.
Motor vehicles (36,632)—J. D. Siddeley.

1919

Life guards for tramcars and omnibuses (10,472—*153,337*)—W. Dickie.
Tramway locomotives (12,770—*153,342*)—Sir J. A. F. Aspinall and English Electric Company.
Brake to prevent motor and like vehicles running backwards down hill (19,553—*153,387*)—B. Williams.
Safety controlling gear for electrically-propelled vehicles (28,628—*153,467*)—R. Garrett and Sons and F. Garrett.
Electrical equipment of mechanically-driven motor vehicles (21,957—*153,721*)—F. H. Bowman and R. L. Aspden.
Direction indicating device for vehicles (23,281—*153,738*)—O. D. Edmonds.
Life guard for the front wheels of motor omnibuses (31,140—*153,794*)—L. Randerson.
Gear boxes for motor vehicles (18,044—*153,940*)—C. H. and O. E. Hanwell.
Motor vehicles (20,128—*153,959*)—L. Taussig.
High speed jack (21,310—*153,988*)—S. Percival (*Duff Manufacturing Company*).
Lifting jacks (22,549—*154,011*)—C. A. Jones.
Lifting jacks (30,987—*154,078*)—A. D. Powell.
Anti-skid device for motor road vehicles (12,744—*154,245*)—L. Green.
Radiators for motor vehicles (20,135—*139,750*)—J. B. D. L. Chardard.
Starting mechanism for motor vehicle engines (20,497—*154,296*)—F. Lamplough.
Motor road vehicles (21,764—*154,359*)—L. C. Humfrey.
Friction driving gear for motor vehicles (23,748—*154,393*)—A. G. Grice.
Retaining means for points for tramways (26,461—*154,416*)—N. A. Krag.
Change speed gear mechanism for motor vehicles (30,863—*154,456*)—T. L. Carbone.
Motor road vehicles (27,200—*154,775*)—Alldays and Onions and A. W. Reeves.

1920.

Differential or balance gearing for motor vehicles (13,963—*143,563*)—W. Luxmore.
Controls for change speed gears for motor vehicles adapted to be driven in either direction with equal facility (20,285—*148,465*)—Daimler-Motoren Ges.
Electric vehicle controllers (23,181—*149,921*)—G. L. Meyfarth.

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TRAFFIC RETURNS.

Tramway and Omnibus Undertakings in the United Kingdom.

NAME OF COMPANY OR CORPORATION.	1919-20. WEEKS ENDED					1920-21. WEEKS ENDED					AGGREGATE.		
	Dec. 6	Dec. 13	Dec. 20	Dec. 27	Jan. 3	Dec. 4	Dec. 11	Dec. 18	Dec. 25	Jan. 1	Wks.	1920.	Increase or Decrease.
	£	£	£	£	£	£	£	£	£	£		£	£
Aberdare Corporation	579	585	593	...	...	574	454	565	...	...	38	23,395	- 2,833
Aberdeen Corporation	3,069	2,950	2,951	3,082	3,170	3,614	3,656	3,436	3,415	3,693	30	121,220	+ 19,320
Ayr Corporation	451	458	465	458	529	548	523	521	546	572	33	27,218	- 2,508
Barrow Corporation	646	627	669	659	693	916	836	865	840	933	39	35,508	- 5,471
Belfast City Tramways	10,183	10,197	10,663	10,023	...	11,654	11,412	11,355	12,734	...	39	418,339	+ 46,845
Birkenhead Corporation	2,872	2,931	3,035	2,742	2,953	3,125	2,865	3,029	2,849	3,185	39	131,751	+ 15,507
Birmingham Corporation	26,980	26,978	27,550	23,027	26,275	34,186	33,583	32,847	30,455	31,699	40	1,236,884	+ 204,620
Birmingham Motor 'Buses	1,705	1,690	1,737	1,354	1,635	1,972	1,881	1,790	1,667	1,750	40	79,382	+ 10,641
Blackburn Corporation	1,925	1,952	2,032	2,201	2,084	2,336	2,429	2,160	2,432	2,710	39	104,057	+ 12,548
Bradford Corporation	10,789	11,856	11,110	10,032	11,328	13,841	13,872	13,947	12,073	15,443	40	520,687	+ 65,444
Burnley Corporation	2,833	2,960	2,896	3,109	3,023	3,222	3,328	3,169	2,788	3,837	—	—	—
Burton-on-Trent Corporation ...	524	500	563	570	546	637	590	626	626	724	40	24,012	+ 3,718
Bury Corporation	2,067	2,048	2,055	2,014	2,308	2,253	2,141	2,153	1,985	2,629	39	100,633	+ 6,399
Chatham and District	1,323	1,372	1,428	1,449	1,162	1,615	1,549	1,455	1,750	1,857	52	90,080	+ 11,999
Cork Electric	687	748	762	806	616	676	661	441	711	724	52	40,825	+ 3,990
Derby Corporation	1,921	1,895	2,058	1,926	2,062	2,216	2,177	2,153	2,175	2,612	40	90,112	- 12,285
Dundee City	2,459	2,395	2,449	2,585	2,535	3,109	3,086	3,031	3,026	3,229	32	98,832	- 15,572
East Ham Corporation	1,858	1,870	1,857	1,926	1,727	2,165	2,204	2,139	2,312	2,336	39	80,896	+ 4,788
Edinburgh Corporation (Cable) ...	9,353	9,094	9,528	9,470	...	11,220	10,476	10,597	11,138	...	32	387,795	+ 32,811
Edinburgh Motor 'Buses	...	...	...	...	...	1,647	1,792	1,776	1,872	...	—	—	—
Glasgow Corporation	32,154	32,012	32,871	32,062	33,579	47,484	45,044	43,923	46,507	47,032	30	1,379,905	+ 388,772
Glossop (Urban Elec. Supply Co.)...	215	212	231	229	223	239	243	233	201	285	1	286	- 63
Halifax Corporation	3,148	3,096	3,257	3,415	3,343	4,130	4,176	3,971	4,198	4,276	38	165,346	+ 25,351
Halifax Motor 'Buses	76	81	79	89	86	107	111	98	103	115	38	4,306	+ 1,008
Huddersfield Corporation	4,869	4,714	4,709	4,549	4,853	5,064	5,043	4,864	4,389	6,052	40	202,993	+ 8,062
Ilford U.D. Council	1,116	1,111	1,179	1,092	1,163	1,313	1,321	1,286	1,293	1,412	39	51,756	+ 4,629
Ipswich Corporation	832	781	855	867	928	808	752	804	815	968	39	39,031	+ 2,006
Isle of Thanet...	432	457	450	568	607	450	417	398	482	654	12	7,398	+ 225
Kilmarnock Corporation	281	274	289	294	400	361	350	332	374	421	33	12,106	+ 2,461
Lanarkshire	3,784	2,762	3,819	3,989	3,540	4,239	4,083	3,933	4,173	5,467	52	221,564	+ 27,729
Leicester Corporation	5,970	6,053	6,213	5,580	6,148	6,532	6,502	6,460	6,206	7,095	—	—	—
Leyton U.D. Council	...	...	...	...	...	...	...	...	...	...	—	—	—
Liverpool Corporation	24,495	24,810	25,742	23,654	24,974	26,763	25,435	25,409	26,029	26,451	52	1,420,076	- 241,886
London County Council	74,703	76,700	78,383	84,867	65,545	98,558	99,240	93,970	102,366	91,493	39	3,499,968	+ 377,435
Maidstone Corporation	330	331	348	382	411	393	385	360	449	449	39	19,209	+ 3,756
Manchester Corporation	29,702	30,260	30,340	25,568	...	37,822	36,701	36,636	32,845	...	39	1,300,960	- 128,565
Newcastle-on-Tyne Corporation ...	9,140	9,143	9,402	8,425	9,029	10,992	11,311	11,110	11,085	10,993	38	433,442	- 59,371
Nottingham Corporation	6,878	6,933	7,110	6,876	7,125	7,430	7,258	7,105	7,799	6,924	39	303,173	- 18,510
Oldham Corporation	4,223	4,325	4,277	4,334	4,429	4,623	4,093	4,241	3,992	4,753	41	190,252	- 8,979
Reading Corporation	1,473	1,495	1,599	1,640	1,613	1,552	1,503	1,481	1,808	1,618	39	65,632	+ 2,924
Reading Motor 'Buses	...	66	89	91	97	241	219	222	278	304	39	10,350	+ 10,028
Rotherham Corporation	2,029	2,057	1,992	2,663	2,134	2,635	2,480	2,666	2,605	2,913	39	104,098	+ 2,458
St. Helens Corporation	1,485	1,519	1,513	1,564	1,489	1,953	2,044	1,838	1,989	2,075	39	81,540	—
Sheffield Corporation... ...	16,335	...	...	18,132	19,374	20,526	...	...	18,838	21,276	40	843,159	- 176,569
Southampton Corporation	2,823	2,919	3,049	3,631	2,411	3,081	3,067	2,854	3,152	2,955	39	123,349	- 15,288
Southampton Motor 'Buses	158	162	168	202	177	327	322	285	330	331	39	9,571	+ 6,522
Southend Corporation	1,287	1,332	1,300	1,627	1,308	1,532	1,519	1,342	1,521	1,610	38	95,258	- 10,190
South Shields Corporation	1,377	1,406	...	...	...	1,827	1,842	...	...	...	37	71,178	+ 18,769
Sunderland Corporation	2,664	2,664	2,763	2,867	2,872	2,855	2,886	2,905	2,660	3,068	40	121,586	+ 6,843
Swindon Corporation	310	322	332	455	311	359	353	328	389	415	39	15,201	- 781
Tyneside Tramways and Tramroads	982	956	959	1,068	...	1,181	1,122	1,086	1,200	...	25	32,196	+ 1,484
Wallasey Corporation	2,145	2,156	2,246	2,090	2,253	2,187	2,435	2,517	2,526	2,862	39	102,793	- 2,405
Walsall Corporation	1,590	1,582	1,651	1,748	1,643	1,967	1,887	1,878	1,858	2,344	40	70,461	- 10,672
Walsall Motor 'Buses	750	720	733	799	742	1,331	1,247	1,231	1,250	1,723	40	45,033	- 21,718
Walthamstow U.D. Council ...	1,503	1,556	1,599	1,682	1,577	1,827	1,813	1,751	1,952	2,192	39	81,533	- 13,512
Warrington Corporation	908	937	952	1,004	943	1,031	1,008	967	1,054	951	39	39,001	+ 3,933
West Ham Corporation	5,120	5,205	5,395	5,172	4,307	6,328	6,315	5,967	7,121	6,142	39	224,647	- 12,835
Wolverhampton Corporation ...	2,146	2,201	2,321	2,748	2,243	2,291	2,309	2,150	2,399	2,635	39	91,513	+ 14,383
Wolverhampton Motor 'Buses ...	327	340	359	448	325	451	458	444	492	513	39	16,915	+ 5,969

Colonial and Foreign Tramway Traffic Returns.

Companies Issuing Weekly Returns.

NAME OF COMPANY.	1919-20. WEEKS ENDED.					1920-21. WEEKS ENDED					AGGREGATE.		
	Dec. 6	Dec. 13	Dec. 20	Dec. 27	Jan. 3	Dec. 4	Dec. 11	Dec. 18	Dec. 25	Jan. 1	Wks.	1920.	Increase or Decrease.
	£	£	£	£	£	£	£	£	£	£		£	£
Anglo-Argentine	68,539	68,920	71,541	70,086	80,007	79,068	84,948	83,801	82,930	96,157	52	4,014,765	+ 886,981
Calcutta ... ... Rs.	94,074	94,158	100,626	92,636	89,859	95,160	94,428	97,293	97,288	93,752	52	4,722,227	+ 275,742
Madras... ... ... Rs.	...	(2 weeks).	47,439	(2 weeks)	53,067	...	(2 weeks)	50,154	(2 weeks)	58,980	52	1,197,400	+ 170,351
Pernambuco	7,920	7,950	7,800	8,859	8,646	5,297	5,406	4,955	5,200	4,875	51	334,949	+ 44,123

Companies Issuing Monthly Statements only.

	1919.						1920.						Wks.	AGGREGATE.	
	July	Aug.	Sept.	Oct.	Nov.	Dec.	July	Aug.	Sept.	Oct.	Nov.	Dec.		1919-20.	+ or -.
	£	£	£	£	£	£	£	£	£	£	£	£		£	£
Ballarat & Bendigo	2,982	2,192	3,396	4,176	4,244	...	3,689	3,588	4,191	4,441	4,810	...	32	32,995	+ 5,185
Brazilian Trac. Mlrs	10,070,000	9734,000	9792,000	9980,000	9796,000	...	11745000	11837000	12043000	1344200	12199000	...	8	122306000	- 18971000
Brisbane	41,610	42,245	41,980	43,530	...	...	53,300	46,650	45,440	46,300	...	...	43	459,330	+ 69,420
British Columbia $	642,090	667,170	684,946	710,405	733,981	...	740,200	756,543	756,950	781,706	805,633	...	22	3,841,032	+ 402,440
Buenos Ayres L'c'z.	45,222	46,846	45,310	49,692	50,654	55,873	51,508	53,952	53,603	57,619	56,747	62,857	26	336,286	+ 42,709
Burma	44,050	43,683	43,152	51,898	46,755	...	52,289	48,552	50,990	55,763	53,679	...	17	208,974	+ 23,486
Cape Town ...	12,792	...	19,759	...	...	...	23,711	...	23,699	...	25,628	...	—	—	—
Carthagena & H. ...	4,183	2,991	1,539	1,465	2,549	2,923	4,164	3,721	2,273	3,319	2,714	5,560	52	50,357	+ 17,916
Cordoba	18,308	17,627	17,833	17,606	...	...	20,197	21,032	19,612	19,636	...	...	30	140,035	+ 17,366
East India ...	2,687	2,761	2,831	2,855	2,709	2,916	4,081	4,109	4,228	4,299	4,234	4,271	21	21,141	+ 7,069
Kalgoorlie	2,815	2,876	3,005	3,095	...	...	3,194	3,111	3,361	3,094	...	...	44	30,703	+ 3,070
La Plata	5,317	5,729	5,541	6,194	4,905	...	5,353	5,715	5,656	6,310	5,573	...	48	61,751	- 1,727
Lima	49,022	49,021	49,144	...	...	...	59,685	58,651	56,513	...	...	...	39	518,414	+ 88,182
Manila ... $	189,653	194,018	...	242,441	...	...	282,260	292,760	...	327,652	...	...	43	2,823,018	+ 749,175
Monte Video ...	34,039	34,873	...	...	40,308	...	39,647	42,771	...	...	43,846	...	4	43,846	+ 3,538
Para	24,659	24,890	24,386	27,849	25,421	...	24,254	24,582	23,185	26,784	24,285	...	52	297,010	- 2,272
Peruvian ... $	...	...	982,850	1179,130	1285,000	...	...	...	1187,300	1187,160	935,050	...	22	5,633,655	- 38,239
Port Elizabeth ...	3,247	...	4,372	...	...	...	...	6,106	5,803	...	6,620	...	—	—	—
Rangoon	6,562	6,472	6,812	7,678	...	...	7,911	7,856	7,657	7,455	...	...	43	78,350	+ 12,200
Toronto ... $	977,262	1083,741	1124,159	1123,801	1111,177	...	1189,315	1225,682	1270,651	1218,290	1250,414	...	48	13200,100	+ 1,646,664
Winnipeg ... $	337,978	353,194	381,248	428,339	461,449	...	391,709	368,616	426,647	444,899	477,957	...	48	4,754,505	+ 917,657

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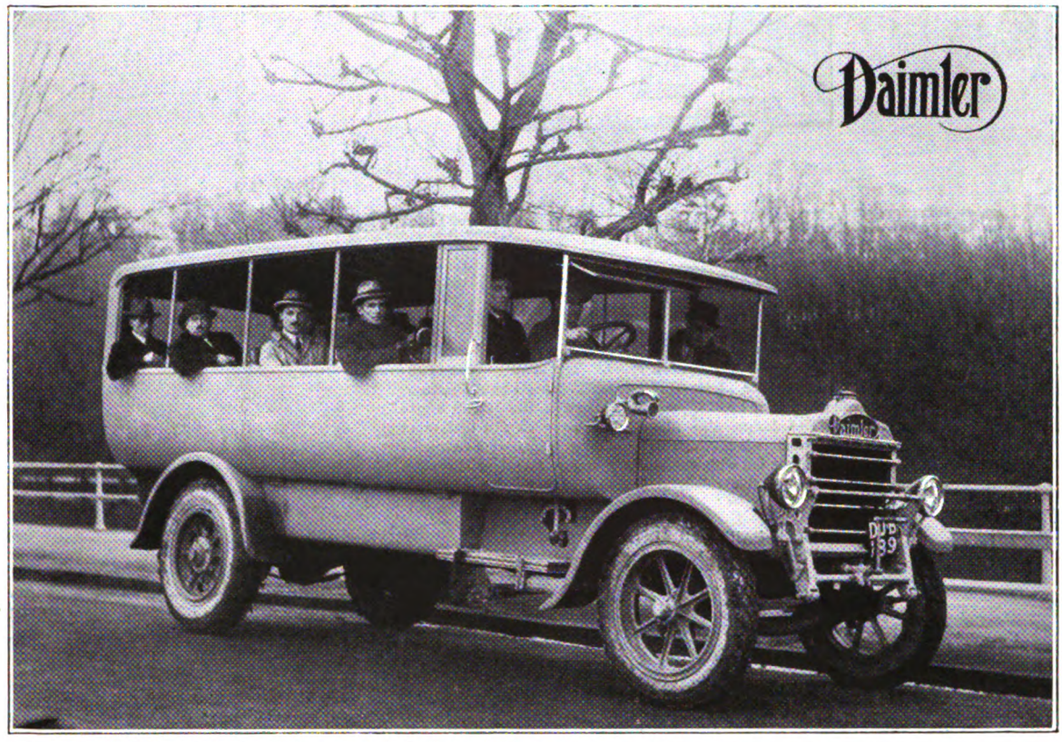

The Daimler Motor Coach on the road at Maidenhead, November 29th, 1920.

Passengers enjoy riding in the Daimler Motor Coach

—because of its comfortable seats and absolute protection against all bad weather.

At any angle of vision the passenger obtains an open view of the country-side and the driver being fully protected can always do full justice to his work. From the driving seat there is no obstacle to the line of sight even when climbing or descending the steepest hill. The lamps and wings are always in full view. Ask your driver what this means to him when he is negotiating traffic and what a bearing it has on safety!

Comfort and safety mean revenue, for the public fully appreciates the qualities of the Daimler Chassis.

The Daimler Company Ltd., Coventry.

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A.E.C. "K" TYPE CHASSIS.

This Chassis is specially designed as an economical and efficient vehicle, particularly suitable for passenger carrying. The arrangement of the driver's position at the side of, instead of behind the engine increases length of loading platform by 3' 6" without adding to the overall length of the chassis. The design also allows a more even distribution of load on the axles and reduces the body overhang behind the rear axle. This feature, in conjunction with the specially designed springs, provides an exceptionally comfortable riding vehicle.

FURTHER PARTICULARS AND COMPLETE SPECIFICATION ON APPLICATION.

Chassis Price, £1,200.

NOTICE.

Will owners of A.E.C. Vehicles not purchased direct from the Company or from its Agents, communicate with us, giving Chassis Nos.

Inspectors will call from time to time to assist and advise them on economical working. Our help and advice is free.

Drivers' Instruction Books for A.E.C. (Y.B. & Y.C.) type Chassis, free on application.

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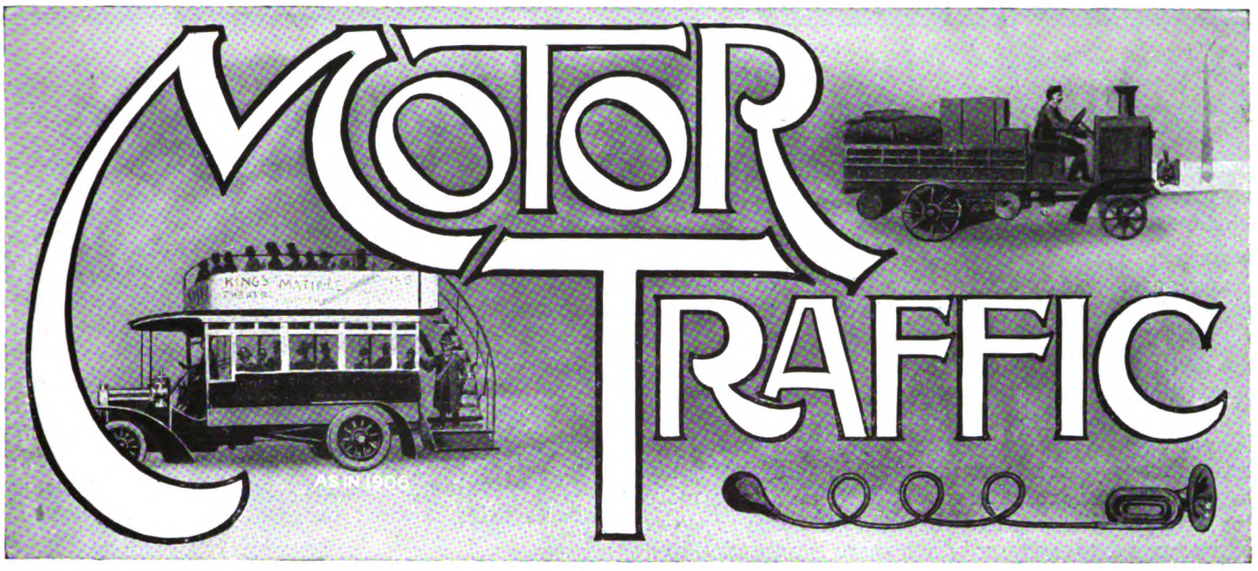

ROAD TRANSPORT PROSPECTS.

In any attempt to review the events and developments of the past year one is faced by the difficulty of distinguishing between the factors which have a disturbing influence on the immediate present and those that are bound to have a more permanent effect in the future. Depression in trade and the increasing volume of unemployment are misfortunes which are apt to obscure more distant and more optimistic considerations. A temporary decrease in the sales of motor vehicles may be, and in fact is, due not to any natural falling off in demand, but to an exceptional aggregation of circumstances. On considering the prospect of development of motor transport, it will be seen at once that before long the world demand for utility motor vehicles must inevitably become very great. Whether Great Britain can put herself into a position to supply that demand is an open question which must be considered separately. For the moment let account be taken of the prospects of a great demand developing.

So far as the home market is concerned we have an overburdened railway system, involving frequent serious delays in the delivery of consignments. The cost of carriage of goods by rail has increased very materially. There is a general tendency to use the road more and more when the total length of the journey is moderate. The rise in the cost of labour has exaggerated the advantage which the road vehicle possesses, inasmuch as its use obviates the necessity for the frequent handling of goods *en route*. Equally the increase in labour costs tends to encourage the use of the motor as against the horsed vehicle, because the former is like all modern machinery designed to increase the productive capacity of the operator. With prices at their present level, we cannot afford to employ a man to assist in doing, say, thirty useful ton miles of transport work in the day when by putting that man on a motor instead of behind a horse we can utilise him to assist in doing, say, a hundred and fifty ton miles of useful work. It is impossible to go on paying a man more than he earns. Consequently, if he demands a high wage his individual output must be sufficient to justify the payment of that wage. His output can only be increased by his own energy or by putting improved machinery at his disposal. Nowadays the manual worker is fully alive to his right to earn a decent livelihood. That livelihood can only be provided for him if his output justifies it. Consequently, there must be at the present moment a very strong tendency towards the introduction of modern machinery in all possible forms of activity. Therefore the rapid growth of motor transport appears inevitable.

FACTORS MAKING FOR PROGRESS.

Turning to oversea markets, and considering the world demand as distinct from that of the United Kingdom, similar influences are seen to be operating even more strongly. There are many countries in which in the near past it would have been futile to attempt to introduce motor transport other than in exceptional cases, because local labour was so cheap that it was impossible for the motor to compete with it on a price basis. Under such conditions the motor vehicle could only be introduced when high speed was the first essential of the proposal, or in other words when the value of the cargo was liable to depreciate rapidly during the journey. Even in the East the cost of labour is now by no means negligible, and the supply is often inadequate if the individual output of the labourer is kept down to an artificially low figure by adherence to the old methods of transport. It follows certainly that great markets for motor vehicles will presently be opened up in countries that have hitherto been contented with an almost prehistoric transport system. The limiting factor for the present is generally the inadequacy of the road system, and in respect of this it may be found in more countries than one that a temporary slump and resulting unemployment will lead ultimately to good results. By far the biggest constructive proposal that our Government has put forward with a view to dealing with the unemployment problem is in connection with the construction and improvement of roads, because the bulk of this work can be done by men not possessed of any lengthy previous training. Great Britain is not the only country which has to face an unemployment problem, and it is reasonable to assume that in other parts of the world also at least a partial solution of that problem will go hand in hand with a comprehensive scheme of road development. It is where roads are good and where labour costs are high that motor transport will most assuredly supplant animal transport with the greatest rapidity. Thus most of the very circumstances that are militating against

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good trade conditions at the moment must in the long run lead to the creation of a great demand for motor vehicles.

PROGRESS IN DESIGN.

As regards the design of chassis there are no very noteworthy changes to be remarked upon as having occurred during 1920; but the tendency in the direction of lightness and simplicity is noticeable. Special attention is, of course, being paid to petrol economy and to the possibility of efficiently using heavier and cheaper fuels. In some quarters special efforts have been made towards the improvement in springing. On the whole manufacturers seem to be giving more attention than they did to the somewhat lighter types of commercial vehicle, for which there is an undoubted demand that the home industry has not very adequately filled in the past. In the matter of reducing terminal delays there remains a great deal to be done. In some instances the process of unloading has been quickened by the provision of various types of engine-operated tipping gear. In the future we may see the introduction of other engine-operated mechanical devices to assist the loading and unloading of all classes of goods, whether fragile or otherwise. In respect of passenger-carrying vehicles, there are two developments particularly worthy of mention. One was referred to in a recent note, in which we discussed the merits and demerits of omnibus bodies, providing enlarged passenger accommodation. The other is, of course, the largest pneumatic tire. Next season this will doubtless be found on a fair proportion of coaches. Later on it may figure also on omnibuses and on trade vehicles. The coach is, however, its natural testing ground.

One cannot charge more for the carriage of goods because the vehicle in which they are carried has pneumatic tires, but the proprietor of the passenger-carrying vehicle of the char-a-bancs class will probably find that he can cover the extra maintenance costs of pneumatic tires by charging rather higher fares. In the first instance the tires will act as an advertisement to attract custom to him. People will be willing to pay for a new experience, and if they find that they get greater comfort it will be possible to charge permanently higher fares without losing custom. The pneumatic will, of course, not get a really fair chance until it is fitted to chassis specially designed with an eye to its use. The better protection it affords to the mechanism should allow of the lightening of many parts. The lower tractive effort required when pneumatics are used may make it possible to reduce engine power slightly, and should certainly lead to substantially improved petrol economy. The first thing, however, is to find out what additional cost the use of giant pneumatics involves over a lengthy mileage. If this point can be settled in a sense favourable to the pneumatic the other necessary developments will follow automatically.

NOTES ON NEW LICENCE DUTIES.

We referred last month to the possibility under the new scheme of taxation of registering vehicles alternatively under whichever class best suits the owner. The fact of the matter is that there has been much loose thinking on the part of people responsible for the new schedules of duties payable, and the result will almost certainly be much to the financial benefit of the legal profession. As we have already stated, it was believed that the Ministry of Transport would somehow contrive to prohibit the registration of a vehicle of a van or lorry class on the horse-power basis. The new regulations do not, however, appear to cover this point, and it seems clear that if a vehicle owner chooses to reserve the right to use a van or lorry occasionally for the carriage of passengers, he not only can, but actually must, register on the horse-power basis. In this case he may possibly get off cheaper while securing a wider range of use permitted to his vehicle. The most absurd instance of all is that of electrically propelled vehicles. If these are "constructed or adapted for use and used solely for the conveyance of goods in the course of trade" they pay anything from £6 to £30, according to their unladen weight. Take the case of an electric van weighing something over four tons. The fee on the unladen weight basis is £30. The van owner may, however, decide to use the machine sometimes for the carriage of passengers or for the cartage of the personal belongings of himself and his friends, in no way in connection with his trade. In that case he obviously may not register on the unladen weight basis. The only alternative is to register under the provision made for "any vehicle other than those charged with duty under the foregoing provisions." Here we find that an electrically-propelled vehicle pays £6 per annum whatever its weight or power. The owner of a heavy electric van will, therefore, save himself £24 a year in taxation if he sees fit to reserve the right to put his vehicle to other than its normal use, and takes the trouble to do this at least once in order to justify the position he takes up.

It is not specifically stated whether a vehicle licensed as a hackney carriage may also be used for the conveyance of goods, but apparently there is no reason against this. In those cases in which it works out cheaper to register on the unladen weight basis, owners of trade vehicles should note that it is not illegal to use these for the conveyance of persons in their employ and in the course of their employment. It should also be noted that under the horse-power basis there is a reduction of 25 per cent. if the vehicle engine was constructed before 1913. Thus, taking, for instance, a vehicle weighing 2¼ tons, and having an engine of 20 H.P. according to Treasury rating, the tax would be £21 a year on the basis of unladen weight, £20 a year with the privilege of freer use on the basis of horse-power, and £15 a year if the engine was built no less than eight years ago.

Reverting to hackney carriages, it should be noted that for the purpose of estimating seating accommodation, which forms the basis of taxation in their case, sixteen inches is reckoned as the allowance per person on a continuous seat. Thus a seat having a length of something above 64 inches, but something less than 80 inches, would be reckoned as providing accommodation for four. One wonders what will happen if the average local policeman discovers a vehicle which has paid taxation as, say, a twenty-four seater,

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crowded up so that, say, thirty people are actually seated in it. Altogether, as already remarked, there seems endless possibilities of litigation. For instance, it may be taken for granted that the authorities would take a very unfavourable view of an electric van owner who evades £24 of tax in the manner mentioned above. The point is, however, that whatever view the authorities take, they themselves are responsible for the regulations which not only permit him to take this course, but actually compel him to do so if he wants occasionally to take his friends for a drive in his machine outside of business hours.

SEATING CAPACITY OF OMNIBUSES

The recent developments of omnibus body design, which are referred to elsewhere in this issue, and for which the London General Omnibus Company has been responsible, may materially affect the basis of the calculations of many tramway managers and engineers. One of their strongest arguments until recently has been that the carrying capacity of the tramcar was something like 120 per cent. greater than that of the motor omnibus, with a result that, while the cost per vehicle mile did not necessarily show the tramcar up in a very favourable light, costs per passenger-mile were decidedly in its favour. Undoubtedly from this point of view of low costs per passenger carried, the more capacious the body of the motor omnibus can be made the better. On the other hand, there must be a limit, not only for engineering reasons, but also because an increase in the capacity of the unit means a decrease in its utility from certain points of view. Smaller passenger-carrying capacity is one of the reasons why the motor omnibus maintains a higher average speed than the tramcar without necessarily attaining a higher maximum speed. When we increase the number of passengers with whom it is possible to deal, we also increase the number of points at which delays must be involved by the process of taking up passengers or setting them down. We also increase the length of time spent on these processes at the main stopping points. Thus, while the omnibus is made to approximate more nearly to the tramcar in respect of what has hitherto been the main economic advantage of the latter, we also make it approximate more nearly in respect of other factors with regard to which it has hitherto had a very great advantage.

"EFFICIENCY IN LUBRICATION."—A twenty-four page booklet dealing with the above subject that has been issued by Messrs. Wakefield & Company deserves attention, for apart from "Castrol," naturally a leading theme, it contains interesting facts about viscosity, specific gravity, flash point, emulsification, and other matters, passing onward to power-house problems, estimating the power of steam or gas engines, and the initial combustion pressure of gas engines—each division being treated with technical precision, supported by illustrative formulæ. Insisting on the study of lubrication problems from the chemical aspect, it is stated, "Factors such as deposits caused by superheated steam, deposits in turbines, sludge deposits in electric transformers, difficulties in the lubrication of Diesel engines and air compressors, etc., are subjects on which considerable work has been carried on here, and suitable oils evolved to meet the conditions." Supplementing this, we have the assurance that the Wakefield Research Department is at the service of interested parties. A copy of the brochure, which is well printed on fine paper, may be obtained from Messrs. C. C. Wakefield and Company, Wakefield House, Cheapside, E.C.2.

ROAD DEVELOPMENT SCHEME.

PLANS OF THE MINISTRY OF TRANSPORT.

In the House of Commons on December 20, on the report of a Vote for the Ministry of Transport, Mr. Neal, the Parliamentary Secretary of the Ministry, stated that they were providing for an expenditure of over £10,000,000 on arterial roads, as to half of it by grants to local authorities, and as to the other half by way of loans, if desired. From the beginning of January there would come into operation the new motor taxes, a certain proportion of which would be used for making new roads. Out of that road fund they intended to apply £1,000,000 in 1921-22, and £1,250,000 in each of the two succeeding financial years. These sums would be available by March, 1924.

The Chancellor of the Exchequer had authorised the Ministry to submit to the House the proposal that in respect of this expenditure of £4,000,000 as it arose he would contribute from the Exchequer at the rate of 30 per cent. That would amount to £1,200,000, making a total sum available of £5,200,000, which would be given by way of direct grant to local authorities in respect of arterial roads. These would be made just as quickly as the works developed which were called for by the state of employment in particular districts.

The problem being urgent, it had been thought right to give further encouragement to local authorities whose finances made them reluctant to embark on enterprises involving capital expenditure. The Government were prepared to lend 50 per cent. of their expenditure, which, with the 50 per cent. by way of grant, would relieve the authorities from the immediate necessity of raisin loans. Ninety schemes had been provisionally agreed with local authorities, at an estimated cost of £2,000,000. Thirty-five authorities were concerned, and work had commenced on 35 schemes in Great Britain. In addition, the Ministry had received many requests for assistance in reconditioning the surface of roads, and they had sanctioned 106 grants for that work at an estimated cost of £844,976, involving free grants of £341,489; 60 or 70 per cent. of the expenditure on arterial roads would be available for wages.

Sir E. Geddes (Minister of Transport) said that the department was not drifting into expenditure which would lead them nowhere. The classification of roads was being prepared with the co-ordination of the local authorities. About 12 per cent. were first-class roads, 14 per cent. second-class, and the remainder local roads, to which the central roads fund did not contribute. The arrangement before the House was come to on the understanding that they should spend this additional money in localities where the Ministry of Labour certified there was grave unemployment, so the co-ordination desired had been attained. Half of the expenditure would be in London, and half in the provinces.

Mr. Neal, replying on the debate, said the Greater London schemes were estimated to find employment for 8,000, and the provincial schemes for 30,000 more. With regard to the question of surface, it was desired that a width of 24 feet only should be metalled, and the remainder left for development as occasion arose. The question of the best form of surface was receiving consideration from a technical committee acting in conjunction with the National Farmers' Union, in the hope of finding a surface which would not be difficult for horse traffic, though suitable for other traffic. As to peripatetic road parties, if employment could be found within reasonable distance of the homes of the workers, that idea was economically sound.

The vote was agreed to.

ROAD TRANSPORT CONFERENCE.

A NATIONAL CLEARING HOUSE SCHEME.

Representatives of the Association of British Chambers of Commerce, Association of Road Transport Clearing Houses, Automobile Association and Motor Union, Commercial Motor Users' Association, Federation of British Industries, and the National Union of Horse and Motor Vehicle Owners' Association, attended a conference held in London at the instance of the Association of Road Transport Clearing Houses.

The conference considered a proposal presented by the Association for the drafting of a national clearing house scheme, and it was agreed to recommend for adoption the principle of one official clearing house for each transport centre, such clearing house to have the official support and co-operation of all the associations concerned. Advisory conferences are to be called in London every three months.

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ROAD TRANSPORT IN THE FUTURE.

Lord Montagu's Predictions.

At the second ordinary meeting of the session of the Institute of Transport on December 13, Lord Montagu of Beaulieu expressed his belief that five years hence there would be 2,000,000 motor vehicles in this country, as against the present day estimate of 750,000. The era of roads and road transport had only just begun. Soon we should see roads made of permanent or semi-permanent material such as glass or concrete, and the annual upkeep—the most important expense at present—would be negligible. Speed limits would be abolished before long, and when, as would certainly happen, special roads for motor traffic were made, the average speeds of passenger motors would equal, if not exceed, present average railway speeds.

Railways would be forced by competition to carry goods and passengers by roads of their own, and it would not surprise him if some lines replaced rails by permanent roads, especially for suburban traffic.

Roads Overhead and Underground.

Overhead as well as underground roads were bound to be made in great cities. Motor vehicles with more than four wheels were also a possibility, and trailers would come more and more into use.

Cars with comfortable sleeping accommodation would be available for long journeys. Then there would be the Channel Tunnel, through which would speed, day and night, vehicles with passengers and goods for all parts of Europe, Asia, and wherever roads existed. In the air and on the road wonderful developments in transport would be seen, not only by the coming generation, but by many present.

The lecturer could not conceive how most of the main roads, designed for the slow, light, and occasional traffic of pre-motor days, could be satisfactory for the fast, heavy, and continuous traffic of the future.

New trunk roads, reserved for the new traffic only, must be made. The railway track, not the pack-horse road, was the model to be followed. The railway companies themselves had within the last few years missed a unique opportunity. They had the chance, but lacked the imagination, to build lines of road along, above, or under the railway, from which they might have derived a good profit by tolls charged for fast and heavy motor traffic.

Goods Traffic at Night.

With regard to fuel, he thought that all the suitable coal in the country should be carbonised for benzole, which, after petrol, was the next most suitable liquid fuel. There were also unlimited possibilities in alcohol as to quantity.

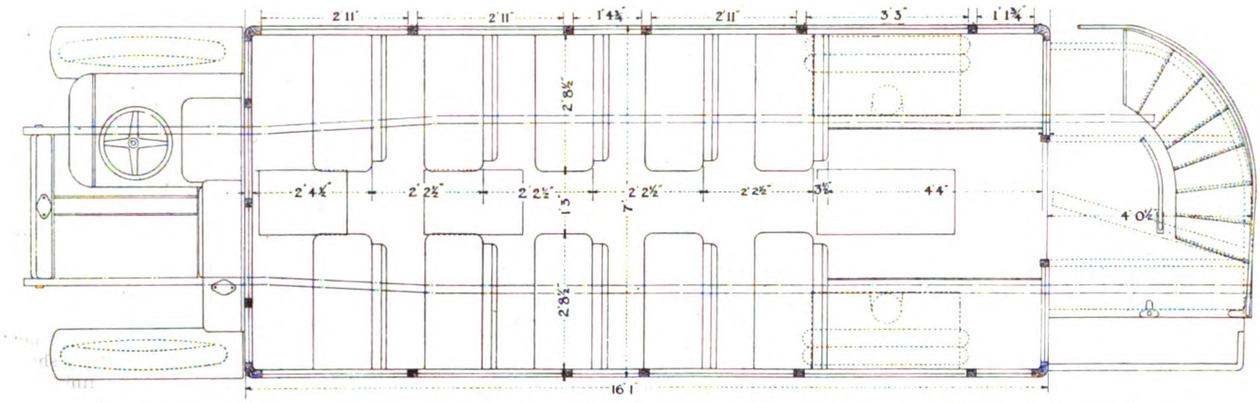
Turning to the commercial side of control, he said that many of the laws underlying railway traffic could be applied as they stood to road traffic. Heavy motors would begin to run more and more at night, not only because there was a clearer road, but because it would be found convenient to convey goods so as to start from the point of origin at the end of one day and arrive at the destination at the beginning of the next. Goods leaving a factory or warehouse in London for towns within a radius of a ten hours' journey not later than 8 p.m. would arrive at six the next morning, and allowing two hours for sorting and checking, could be delivered at 8 a.m. the same day. The door-to-door delivery by road transport, taking less time and costing less, was the secret of the growing popularity of road transport over transport by rail.

S TYPE LONDON OMNIBUS.

Seating Re-Arranged to Provide Greater Comfort.

The new S type of omnibus of the London General Omnibus Company, which was described and illustrated in our issue of December 16 last, has been still further improved. After full consideration, and having special regard to the comfort and convenience of the passengers, the seating plan has been re-arranged so as to give a total of only 54 seats instead of 57. When the first S type motor omnibus made its trial runs in December, it had seats for 29 inside passengers. A transverse seat for five persons ran across the forward end of the interior, the five passengers sitting with their backs to the driver.

Looking towards the rear, there were next five pairs of transverse seats for two passengers each (facing forward) making 20 more seats,



Plan Showing New Arrangement of Seats for 54 Passengers in S Type Double-Deck L.G.O.C. Omnibus.

or 25 in all; and finally, next to the doorway, there were two confronting longitudinal seats for two passengers each, that is to say, four more seats, or 29 inside seats in all.

Under the new arrangement in the S type omnibus, of which a floor plan is given above, the 5-passenger seat is dispensed with. The five pairs of transverse seats are eased forward towards the fore-end of the interior, and the two rear longitudinal seats are enlarged to hold three passengers each. There is thus a sacrifice of five seats forward and a gain of two seats at the doorway end, making a net loss of three seats altogether and reducing the inside complement to 26 instead of 29. The top deck seating remains unaltered, and will provide, as before, for 28 passengers. The total complement of the vehicle will, therefore, be 54 instead of 57 seated passengers.

The new seating arrangement is undoubtedly in every way more satisfactory, as under this arrangement all but six of the inside passengers will be seated so as to face forward, while the interior has a more spacious appearance.

With the reduced seating accommodation, the S type will still show a clear gain of not less than 20 seats over the old B type, which seats 34 passengers, and of eight seats over the K type, which seats 46.

A circumstance worth mentioning is that the public appear not to approve altogether the abolition of straphanging. No passengers are allowed to stand in the K or S types, although the brass uprights would enable passengers to steady themselves, and five persons could stand without serious inconvenience. The saloon has the appearance of being more than sufficiently commodious for the number of persons seated, and the public would raise no objection if passengers were permitted to stand during the rush hours in order that they might more quickly reach their destinations.

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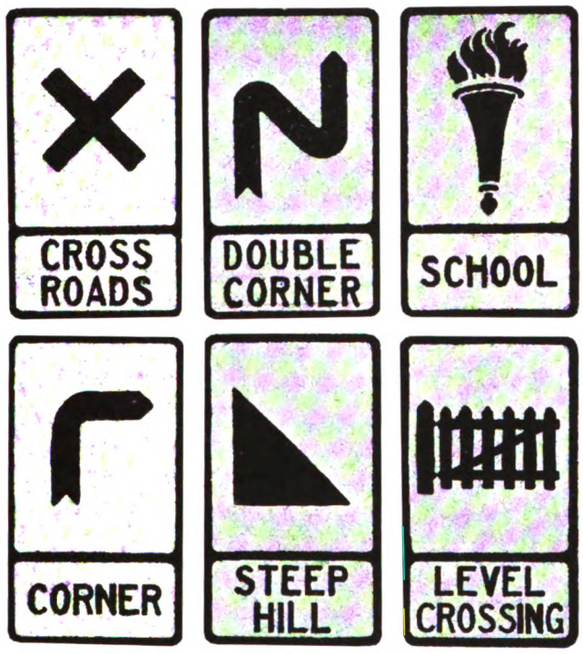
ROAD SIGNS.

PROPOSALS OF THE MINISTRY OF TRANSPORT.

What the motoring organisations and the local authorities have failed to accomplish—the institution of a uniform system of road signs—is suggested by the Ministry of Transport. In 1919 the Ministry appointed a committee of county and borough engineers to report on the question, and on January 1 last the Ministry issued their report. The adoption of the proposals made therein is recommended by the Ministry to local authorities, although there is no suggestion of compulsion. The proposals are recommended as likely to meet with the general approval of the motoring community.

The report insists that uniformity both as regards the type of warning and the mode of erection of posts and signs should be aimed at, as it is clear that less strain is put upon the driver when he has to deal only with uniform types of warnings or directions. The tendency to disregard road warning signs arises from the confusing information presented in the number and variety of private and unofficial signs and commercial notices placed on roads.

The character of the road information which it is desirable to present to the travelling public is classified as follows—(*a*) Road direction posts; (*b*) warning signs and notices; (*c*) village and place signs.



New Motor Warnings.

When the classification by the Ministry of Transport of the main roads has been completed the roads will be given route numbers. It forms part of the proposals with regard to the standard direction posts that the route numbers should be shown on the arms of the posts, a first-class road being indicated by a black letter "A" and the route number on a white ground, and a second-class road by a white letter "B" and the route number on a black ground.

Existing signs for "Speed Limits" and "Prohibition" are to be retained. The red triangular sign indicating "Caution" should in future be used to mean "Danger," and should be referred to as the "Danger Sign." The special danger to be guarded against will be indicated by means of a clear and legible symbol, based as far as possible on the accepted international symbols, upon a plate 12 inches wide and 21 inches high, to be attached to the post below the triangular "Danger Sign." The dangers to be notified in this manner by distinctive symbols are—

Cross roads.	Double corner.	School.
Corner.	Steep hill.	Level crossing.

The symbol will be regarded as the principal means of indicating the nature of the danger to be guarded against. It is not considered necessary that danger signs should be erected at cross roads and junctions which are in visible positions and marked by direction posts, nor that the approaches to towns or villages should be marked by danger signs. Such inhabited places are a sufficient indication in themselves that special care is necessary.

As it is believed that it would be a great convenience to the travelling public if notices were erected on the main approaches to towns and villages, giving the names of such towns or villages standard name plates are recommended to the highway authorities

PETROL PUMP SAFETY TESTS.

NO DANGER FROM EXPLOSION.

Reporting to Manchester Corporation on the Anglo-American Oil Company's system of petrol storage in underground tanks with distributing pumps on the pavement, Mr. G. B. Cole, chief inspector under the Petroleum Acts, states that the outside pump is a new departure as far as this country is concerned, although it has been in common use in Canada and America for some time.

The first question which the Petroleum Committee of the Corporation considered was whether there would be danger to life or property if a pump were knocked over, the connecting or supply pipe broken, and a naked light by any means came into contact with the point of breakage. The chief officer was instructed to communicate with the Anglo-American Oil Company with a view to carrying out experiments to ascertain what would actually happen in such a case. He was also instructed to write to Major-Cooper-Key, chief inspector of explosives, and obtain his co-operation. The experiments were made at Battersea, and there were present, in addition to the company's representatives, Major Cooper-Key, Councillor Johnson, chairman of the Watch Committee; Ald. Ashton, chairman of the Petroleum Committee; Mr. C. Macdonald, chief inspector for the City of Glasgow; and the Manchester inspector.

The pumps were found to be substantially constructed, and erected in such a manner that considerable force would be required to knock one down. It was found that if a pump were broken from its connection at ground level the whole of the spirit in the pump at the time was retained inside, without any fear of spillage in the roadway. The next test was for the purpose of finding out what would happen if a naked light were applied to the point of breakage. A twenty-gallon tank was provided, fitted with the usual connections, but with the pump removed, leaving the suction pipe filled with petrol and fully exposed. A light was applied to the petrol, which simply burned steadily like an ordinary lamp. The flame was immediately extinguished by placing the naked hand over the end of the pipe.

A further test was made to ascertain what would happen if the valve between the suction pipe and the tank were prevented from acting. For this purpose the valve was lifted from its seating, and the petrol from the suction pipe allowed to run back into the tank. This left the suction pipe filled with an explosive mixture of air and vapour, while owing to the small quantity of petrol used the level of the petrol in the tank was below the lower end of the pipe This state of things could not arise unless the valve were out of order. A light was applied to the opening of the pipe, setting fire to the explosive mixture, but after burning steadily for a few seconds it went out. This test was repeated several times with the same result. It was found that the flame was suffocated after travelling about six inches down the pipe. During none of the tests was there any sign of an explosion.

As the result of these tests the Manchester inspector had no hesitation in saying that in his opinion there would be no danger in allowing pumps to be placed in any position on the pavement where the traffic permits. This was also the opinion expressed by Major Cooper-Key. Mr. Cole adds that this report applies solely to this type of underground tank and the pump connected therewith. It does not apply to other systems which have not yet been tested, neither does it apply to the tank wagons by means of which underground installations are filled. Many tank wagons, as at present constructed, are far from satisfactory, and it is suggested that all such wagons, when used for the conveyance of inflammable spirits, should be subject to the same supervision as storage tanks and fitted with similar safety devices.

A.E.C. REPAIR VANS.—The Associated Equipment Company have placed six service vans for the repair of their vehicles in various districts. Application for the service of the vans can be made to the company's agents or to the works at Walthamstow.

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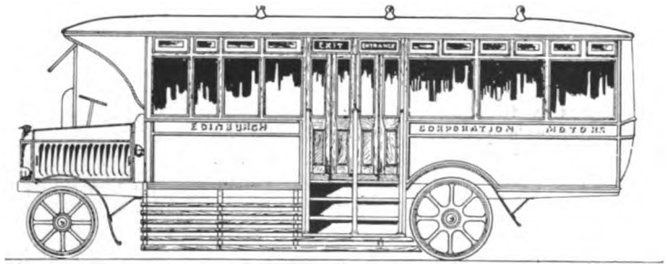
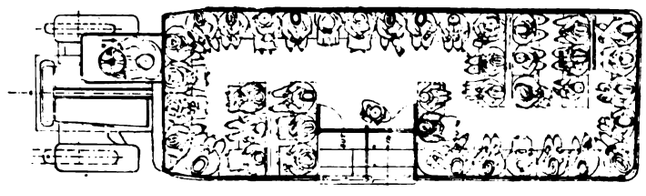
MOTOR TRAFFIC

NEW OMNIBUS DESIGN FOR EDINBURGH.

The accompanying sketches reproduce the principal features of the design for new motor omnibuses for Edinburgh Corporation Tramways department. In working out the design, Mr. R. S. Pilcher, general manager of Edinburgh tramways and omnibuses, has aimed at easy access and rapid loading and unloading. Owing



Elevation.



Seating Plan.

New Motor Omnibus Design for Edinburgh.

to local conditions single-deck vehicles are required. As will be seen from the drawings, the vehicle has double doors on one side forming separate entrance and exit, and seats arranged in a novel manner for 42 passengers. The driver's position is beside the engine, as in the later types (K. and S.) of the L.G.O.C. The bodies for the first vehicles will be constructed in the department's own shops.

ABOLITION OF DUTY ON PETROL.

Concurrently with the coming into force, on January 1, of the new motor taxes, the price of petrol in Great Britain was reduced 7d. per gallon. Sixpence of that amount was on account of the duty per gallon, the remaining penny being distribution and other charges. The 7d. tax was imposed in September, 1915. The reduction is made in accordance with the promise made by the petrol companies when the various motor duties were merged in the new single tax. The remission, however, leaves the consumer where he was in the early part of 1920, when the companies raised the price by 7d.

The best quality will now be 3s. 5½d. per gallon and the cheapest grade 3s. 3½d., the price in Scotland being, as before, 1d. per gallon more.

During the past year some 710,000 tons of petrol, equal to 5,500,000 barrels, or over 200,000,000 gallons, have been imported into the United Kingdom. Of this amount practically 550,000 tons were brought in and distributed by the Anglo-American Company and the Shell Company, the importations of the two concerns being virtually equal. About three-fifths of the total intake of petrol came from America.

MILEAGE CHARGE FOR OMNIBUSES.

Proprietors of omnibuses and chars-a-bancs who have agreed to pay mileage charges in respect of new omnibus routes are advised by the Commercial Motor Users' Association not to make any payments in respect of the period after December 31, 1920, but to at once write to the Ministry of Transport, Roads Department, 7, Whitehall Gardens, London, S.W.1, stating the facts of their cases and asking that the Minister will cancel the liability to make any payment to the local authority under the powers given to him by the Roads Act, 1920.

HALIFAX OMNIBUS ACCOUNTS.

In a report on the working of the motor omnibus services of Halifax Corporation Tramways department, the borough treasurer gives the following statistics of the variation of mileage, income and costs during the eight years' existence of the omnibus services.

	Miles run.	Passengers.	Receipts per mile.	Average fare.	Total cost per mile.	Profit + Loss − per mile.
			d.	d.	d.	d.
1912-13	20,346	128,479	8·47	1·34	13·52	−5·05
1913-14	68,385	434,826	8·95	1·41	9·56	− ·61
1914-15	67,438	423,006	8·88	1·41	8·11	+ ·77
1915-16	63,031	410,348	9·25	1·42	10·60	−1·35
1916-17	61,102	433,573	10·05	1·41	10·69	− ·64
1917-18	48,054	449,188	13·05	1·39	15·43	−2·38
1918-19	51,021	502,003	16·48	1·67	16·20	+ ·28
1919-20	52,752	548,441	19·93	1·91	27·01	−7·07

For 1919-20 the total income was £4,382, or 19·94d. per mile run, as compared with £3,503 or 16·48d. in 1918-1919, an increase of £879 or 3·46d. per mile run. The expenditure was £5,938 or 27·02d. per mile run, as compared with £3,444 or 16·20d. the previous year; an increase of £2,494 or 10·82d. per mile run. The final result was a loss of £1,556 as against a surplus of £59 for 1918-19.

Subjoined is the revenue account in detail.

Expenditure.	1919-20 Per mile.		1918-19
	d.	£	£
Traffic expenses—			
Motormen and conductors' wages ...	7·889	1,734	1,215
Cleaning omnibuses	·855	188	146
Licences	·055	12	12
Uniform and sundries	·323	71	50
Hire of chars-a-banc	1·592	350	—
	10·714	2,355	1,423
General expenses—			
Third party and other insurances ...	·491	108	122
Printing and sundries	·078	17	9
Proportion of rent, rates and management expenses	·682	150	100
	1·251	275	231
General repairs and maintenance—			
Bodies	·655	143	53
Chassis, gearing, etc.	4·954	1,089	271
Ignition fittings	·186	41	5
Engine and water circulation	1·583	348	151
Oiling and lubricating	1·173	258	232
Lighting fittings...	·182	40	38
Garage and various	·268	59	27
Tires	2·000	440	365
	11·001	2,418	1,142
Gas containers and repairs	·250	55	104
Petrol	2·398	526	181
Gas	1·401	308	363
Total expenditure	27·015	5,937	3,444
Income.			
Traffic Revenue	19·936	4,382	3,503
Miles run	52,752	—	51,021

The fourth and sixth sections of the above account are particularly interesting, as showing the expenditure on petrol and coal gas in the past two years, gas having to be resorted to during the final year of the war. For the past year the cost of fuel was £889, as against £650 in 1918-19, while the mileage for the past year increased by only 1,731 miles.

MAUDSLAY AGENTS IN INDIA.—The Maudslay Motor Company, Limited, of Coventry, have arranged with Messrs. Marshall, Sons, and Company (India), Limited, with branches in Calcutta, Bombay, Madras, and Lahore, to take the sole agency for India of Maudslay commercial vehicles, omnibuses, chars-a-bancs, etc.

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MOTOR TRAFFIC

INDICATORS FOR PUBLIC SERVICE VEHICLES.

The question of destination indicators is now an important item in the traffic problem, and nothing belittles a public service route more than badly placed and indistinct signs and indicators. The tramways have during their development gradually improved their car destination screens, and new omnibus companies thus have the advantage of their experience. For various reasons distinct signs are still more necessary on omnibus services both during the daytime and at night, and designers of vehicles not infrequently overlook this fact.

One of the latest innovations is shown in Fig. 1, fitted in position on one of the well-known Leyland cars. It will be seen that the

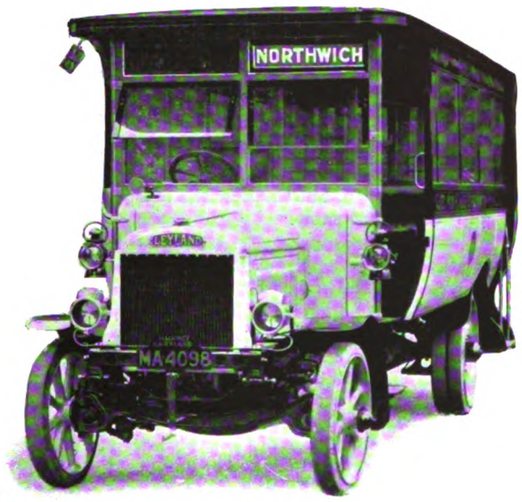

Fig. 1.

front indicator is placed at the ventilator space at the front and in the vestibule window in the rear. To meet this novel plan special indicators had to be designed. (Figs. 2 and 3.) The curved back is of stout gauge metal. The ends are of well-seasoned oak, and standard screen fittings and rollers are employed. An interesting feature is that as the indicator is fitted behind the omnibus window no front glass is necessary. Such an attachment as this has the unique advantage of rendering the indicator weatherproof. The method of fixing is simplicity itself. The blind rollers are operated direct through crank handles. Milled wheel handles can be supplied if desired, and these form a very effective finish. The

Fig. 2.

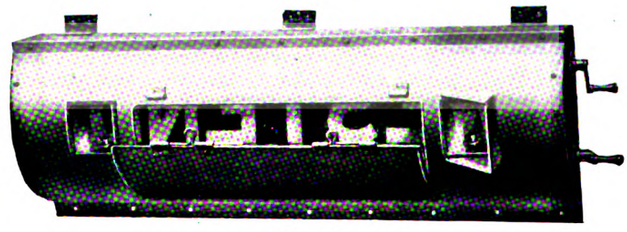

Fig. 3.

ironwork and casing if necessary can be decorated to harmonise with the colour scheme of the car.

Another indicator which is already in great favour, has an external resemblance to the familiar pattern used on tramways. This can conveniently be arranged for suspension either above or beneath the canopy. As the ordinary tram indicator case was not designed to cope with the severe vibration and other conditions withstood by motor omnibuses, very radical alterations both in the case itself and the fittings had to be made. These include special iron angle pieces to strengthen the corners, and the fixing fittings at the front of the frame and the doors are such that they will not become unfastened by the ordinary jolting of the vehicle.

Where the indicator is fitted above the canopy, or in such a position that it requires a vertical spindle drive, the Equipment and Engineering Company have introduced and patented an entirely new type of gearing. In this case the use of bevel cog wheels with a change of direction of motion has been altogether avoided, and replaced by a helical gear drive of the simplest possible form. There is no change direction device necessary, the simple turning of the handle in either direction moving the blind up or down. This is attained by the use of the end thrust due to the helical gears, which brings the respective gears into mesh automatically. Another interesting feature is that the rollers are detachable from the indicators without the use of tools when removing or changing blinds. The neat, compact form of this device, and the small space it occupies, gives a larger name space while retaining the exterior measurements within ordinary limits. It is also reversible, that is, can be fitted to operate at the right or left hand side of the indicator. For side windows or interiors a smaller type of indicator has been designed, which can be operated either from the ends or the back.

The Equipment and Engineering Company, of 2 and 3 Norfolk Street, Strand, London, have studied this branch of work since their establishment, and the superiority of their linen blinds is proved by the reputation they have gained. The process by which the names of destinations are printed, together with the specially treated linen, have gone far towards their success. They withstand the most frequent rolling and unrolling without apparent injury either to fabric or printing, while the most severe weather conditions fail to affect them in any way. The clearness of the E. and E. screens for indicating destinations both by day and whilst under illumination at night leaves nothing to be desired.

INSTITUTION OF AUTOMOBILE ENGINEERS.

A meeting of the London graduates of the Institution of Automobile Engineers was held on December 16, when Mr. T. E. B. Whiting read a paper on "Carburation" before 42 graduates and visitors. Mr. F. Leigh Martineau was in the chair. After defining carburation the author dealt with the fuels available for combustion and the necessity for completely vapouring the fuels in the engine. He then discussed the application of heat to keep the vapour pressure high with the object of assisting vaporisation, and the difficulties involved in connection with the complex fuels obtainable to-day, which complicate the question of really homogeneous mixtures. The effect of inertia was then dealt with, both in regard to that of the fuel in the jet and the mixture in the induction pipe, and suggestions were made for minimising it. After discussing the details of a carburetter, the extra air inlet valve, the jet, the throttle, and the float chamber, the author pointed to the need for checking the functioning of a carburetter by analysing the exhaust gases to ascertain whether the correct mixture is being given, and concluded by describing the various means adopted for obtaining a correct mixture at all engine speeds. The discussion proved to be of the greatest interest, the remarks of Mr. R. W. A. Brewer on the methods adopted in the United States for burning the very poor class of fuel obtainable there being of particular value.

British Motor Trading Corporation.—The first report of this company, covering the fourteen months to June 30 last, shows a turnover of £1,500,000 and a gross profit of £138,561. After deducting a loss of £39,127 on foreign exchange, £24,635 interest on loans, and £2,000 reserve for doubtful debts, a net profit of £72,798 is carried forward.

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MOTOR TRAFFIC

MOTOR VEHICLES FOR MUNICIPALITIES.

AUDLEY (STAFFS.) URBAN COUNCIL are borrowing £1,300 for the purchase of a steam wagon.

RISHTON URBAN COUNCIL have obtained permission to borrow £900 for the purchase of a lorry.

WIGAN TOWN COUNCIL are to obtain a loan of £1,970 for the purchase of a motor fire engine.

LONDON COUNTY COUNCIL HIGHWAYS COMMITTEE have purchased two Austin cars for the tramways department.

LEYTON URBAN COUNCIL are borrowing £2,000 for the purchase of charging plant for the motor dust van depot.

SHEFFIELD TRAMWAYS AND MOTORS COMMITTEE have arranged to garage the Lord Mayor's car and provide a driver.

CAMBERWELL BOROUGH COUNCIL have appointed a sub-committee to consider a report as to the purchase of a motor car.

LEYTON URBAN COUNCIL have purchased a Ford 1-ton truck chassis for £230 from the International Motors, Limited, Hammersmith.

WALTHAMSTOW URBAN COUNCIL are borrowing £5,025 from the Scottish Legal Life Assurance Society in order to purchase steam wagons.

GLASGOW HEALTH COMMITTEE have asked the city engineer to accept offers for supplying and installing an underground tank for the storage of petrol at Robroyston Hospital.

ROTHERHAM WORKS COMMITTEE have been informed by Messrs. Ransomes, Sims and Jefferies that they are prepared to accept a firm price of £1,150 each for two Orwell electric chassis.

HACKNEY MEDICAL OFFICER OF HEALTH having asked for the use of a motor car for five hours a week, the Health Committee suggested acceptance of a quotation to supply a car at a rate of 1s. 2d. per mile.

DEPTFORD BOROUGH COUNCIL have obtained a "Service Six" garage lathe from Messrs. Hudson and Griffiths, in order that repairs to motor vehicles may be executed in the garage, thus reducing the cost.

THE METROPOLITAN ASYLUMS BOARD have ordered from Rapson Automobile Patents, Limited, four Rapson tires, 820 by 135, at £27 9s. each (including outer cover, deflector, and inner tube), less 15 per cent. and 5 per cent.

EDINBURGH CORPORATION propose to purchase several cars for the use of the various departments. A joint committee of the Tramways, Cleansing and Lighting Committees recommended that seven cars should be obtained.

MANCHESTER HEALTH COMMITTEE, finding it uneconomical to use a handcart for the conveyance of materials required for the painting of various properties of the Council, the Corporation recommend the purchase of a motor lorry.

LAMBETH BOROUGH COUNCIL are purchasing a motor disinfecting van to replace two horsed vehicles which are costing £21 13s. 4d. per week to run. The motor, which will do the work of the two horsed vans, will cost £10 14s. 8d. a week to run.

HULL CITY ENGINEER having stated that it was becoming necessary in connection with his work to have a motor car, and he would buy one if the Corporation would supply the petrol and maintain the car, the committee acquiesced in this arrangement

SOUTH SHIELDS CORPORATION'S application for a loan for the purchase of three battery vehicles and two Foden wagons was the subject of an inquiry by an inspector of the Ministry of Health. In accordance with the request of the inspector, the Corporation have decided to keep a comprehensive costing system of their motor transport work.

SWANSEA WATCH COMMITTEE have received a report from the chief constable on the test of the new Dennis fire engine. The test was satisfactory in every respect. He recommended, however, that a three-way connecting head be obtained to connect the pumps of the engine to the street hydrants if at any time the pressure of water in the mains were inadequate. The committee agreed to obtain the appliance, which will cost £15.

THE ILFORD SURVEYOR, who introduced electric vehicles for refuse collection in the urban district of Ilford, has reported that the cost per day of an electric vehicle is £2 8s., made up as follows—Capital charges 15s., man 14s. 3d., supervision 2s. 2d., tires 2s., current 5s., oil and grease 4d., acid 1d., garage rent 4d., new work to garage 2d., insurance 1s., charging plant 8d., men charging 2s. 9d., lighting garage 4d., battery renewals 1s. 8d., incidentals 2s. 3d.

OMNIBUS SERVICES.

CARDIFF.—The tramways committee have placed an order for six Tilling-Stevens petrol-electric omnibuses.

NOTTINGHAM.—An addition of six Dennis omnibuses is to be made to the omnibuses of that make already operated by the tramways committee.

PERTH.—The tramways committee, who run omnibuses to districts beyond the tramway termini, propose to acquire four additional omnibuses.

DUNDEE.—On the recommendation of Mr. W. T. Young, the tramways manager, the tramways committee are obtaining two omnibuses and two coaches.

WEST HARTLEPOOL.—The tramways department have decided, with the consent of the Corporation, to discontinue the omnibus service, the vehicles having been operated at a loss.

OMNIBUS SERVICE FOR DURHAM.—In the next session of Parliament the Durham County Council propose to seek powers to run motor omnibuses and railless vehicles on various routes within the county.

BRIDLINGTON.—A special committee have advised the Corporation not to provide the omnibus services authorised by the Corporation Act of 1920, but to allow the proprietor of the present services to increase the same.

SALFORD.—The Corporation Tramways department early in December extended the Broughton-Pendleton motor omnibus service to Weaste. The service is half-hourly, and begins at 7.10 a.m., ceasing at 10.30 p.m. The department propose to borrow £14,000 for additional omnibuses.

SUNDERLAND-SOUTH SHIELDS.—The Northern General Transport Company, Limited, of Gateshead, have notified the South Shields Corporation that it is proposed to institute regular omnibus services between South Shields, Harton, and Sunderland. The company have applied for the permission of the Corporation to open forthwith the portions of the proposed service route within South Shields.

LANARKSHIRE.—After holding an inquiry into the Lanarkshire Tramways Company's application for powers to run omnibuses into Glasgow, the Scottish Office declined to insert a clause in the Provisional Order to protect the interests of Glasgow Corporation. The parties have since come to an agreement, and to secure its inclusion in the Order the Corporation will petition under the Private Legislation Procedure (Scotland) Act.

NEWCASTLE CORPORATION OMNIBUSES.—Durham County Council have received an application from the Newcastle Corporation for consent to the immediate running of omnibuses from Scotswood Bridge Head to Blaydon and Ryton Lane Head, and have authorised the Council surveyor to interview the Newcastle city surveyor, after consultation with the local authorities concerned, with a view to determining the amount to be paid by the Corporation for adapting roads for the traffic and maintenance.

HERTFORDSHIRE.—For the purpose of augmenting their Hertfordshire services, the London General Omnibus Company are building a large garage at Watford. The Herts County Council have accepted an offer from the company of £500 down for the use of roads for new routes until January, 1921, when the new duties on road vehicles came into force. The Ministry of Transport have informed the Council that a Bill is to be brought in to abolish the veto given to highway authorities under the Emergency Provisions Act, 1916.

SHEFFIELD.—The general manager of the Corporation Tramways and Motors Department has prepared an estimate of income and expenditure of the omnibus service for the year ending March 31, 1921, showing a credit balance of £119. The total receipts are computed at £100,277, and the estimated expenditure as follows—Traffic expenses, £39,400; general expenses, £3,306; repairs, £25,123; power expenses, £20,744; road maintenance, £795; interest and sinking fund, £5,994; income-tax, £142; depreciation on omnibuses, £4,654.

BELFAST OMNIBUS SERVICES.—The question of providing roads suitable for omnibus traffic came up at a meeting of the Corporation on January 3, when Ald. Duff asked that the tramways committee should make certain that the omnibuses about to be acquired were suitable for the roads. Councillor Anderson, vice-chairman of the committee, said that it was their intention to ask the Improvement Committee to make the streets suitable. The Council adopted a resolution asking for sanction to borrow £4,000 for the provision of omnibuses. It was stated that the vehicles were to cost £500 each.

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MOTOR TRAFFIC

EASTBOURNE.—The Corporation omnibus undertaking, which was inaugurated as far back as 1905, made a net profit of £403 for the year ended March 25 last. The fleet comprises 25 Leylands and one other make, and with the exception of six they are double-deck vehicles. The total income was £37,279, of which £35,047 came from fares. The expenditure was £34,254, including £22,790 running expenses, £8,104 repairs and maintenance, £744 depot expenses, £2,420 management expenses, and £195 general expenses. The gross profit was £3,024. Interest absorbed £232, income-tax £451, instalment of cost of omnibuses £1,856, instalment of cost of depot extension £109, bringing the total to £2,765, and leaving a net profit of £403. The depreciation and reserve fund account amounts to £11,801.

LONDON.—The Highways Committee of Wandsworth Borough Council have considered an application from the London General Omnibus Company for consent to the use of Nightingale Lane, etc., for omnibus traffic. The committee reports that the neighbouring Borough Council of Battersea have declined to consent to the use of the portion of Nightingale Lane within that borough on the ground that the road would first require strengthening. The company state that they propose to submit the matter to the Ministry of Transport so far as Battersea are concerned, and are anxious to know the attitude of the Wandsworth Council. The committee suggests informing the company that the roads would require reconstruction before being suitable for omnibus traffic, and that if this work is first carried out free of cost to the Council, no objection would be raised to the opening of such route

MOTOR DRIVERS' EXAMINATIONS.

The fifteenth annual examinations of drivers, organised by the Commercial Motor Users' Association, with the object of encouraging drivers to take a personal interest in the driving and condition of their vehicles, and to run them without accident, will take place during the last week of April, 1921. These examinations, which hitherto have been confined to London and the Home Counties, will now be open to any driver in Great Britain, and will be held in various provincial centres. Each driver who obtains more than a fixed percentage of marks will receive a money prize, a medal, or a certificate. There will be several prizes each of the value of £10, £5, £3, £2, £1 10s., £1, and 10s.

There will be three classes of examinations, each of which will be divided into three sub-classes, as follow—

National Championship Examination (written and practical)—(*a*) Steam; (*b*) petrol; (*c*) electric.

Divisional Championship Examination (written and practical)—(*a*) Steam; (*b*) petrol; (*c*) electric.

General Examination (written only)—(*a*) Steam; (*b*) petrol; (*c*) electric.

Full particulars of examinations may be obtained upon application to Mr. F. G. Bristow, general secretary, Commercial Motor Users' Association, 50, Pall Mall, London, S.W.1.

"MOTOR TRANSPORT" is the new title of that well-known weekly *Motor Traction*.

ELECTRICARS, LIMITED, of 47, Seymour Place, London, W.1, have taken over the vehicle side of Edison Accumulators, Limited, who will in future specialise only in the installation of batteries.

"THE TRANSPORT WORLD AND MOTOR FREIGHT EXCHANGE."—On January 5, Benn Brothers, Limited, of 8, Bouverie Street, E.C.4, published the first issue of *The Transport World and Motor Freight Exchange*. The paper is divided into two parts, the one giving information as to freight waiting transport and the other announcing transport facilities as available for freight. It is proposed to publish free of charge information under either of the above headings.

INTERNATIONAL AUTOMOBILE EXHIBITION.—We have received particulars of an International Automobile Exhibition to be held at Basle from May 23 to June 8, 1921, under the patronage of the Automobile Club of Switzerland. Dr. R. Haab, chief of the Swiss postal and railway department, and M. J. Megevet, president of the Automobile Club of Switzerland, are honorary presidents, and Dr. W. Meile is the general manager. The head offices are at Gerbergasse 30, Basle.

LONDON MOTOR PARADE.

The fifteenth annual parade of commercial motor vehicles, organised by the Commercial Motor Users' Association, with the object of encouraging drivers to take a personal interest in the driving and the condition of their vehicles, and to run them without accident, will take place in London on Saturday, April 2, 1921, under the patronage of the King. The handsome silver challenge cup, will again be awarded to the owner whose "team," in the opinion of the Judges' Committee, is in the best condition, having regard to the class of work upon which the units are employed, the ages of the machines, and the total distances run by them. The driver of each vehicle in the winning team will be given a cash award and a silver medal as a souvenir of the event. The drivers of each vehicle in the "runners-up" and third team will also receive a cash award, and drivers of each vehicle in fourth, fifth, sixth and seventh teams will be "highly commended." Full particulars of the parade may be obtained on application to Mr. F. G. Bristow, 50, Pall Mall, London, S.W.1.

MOTOR TRAFFIC NOTES.

COMMERCIAL MOTOR USERS' ASSOCIATION.—Mr. W. Atkinson, of Preston, has been appointed secretary of the North-Western Division of the Commercial Motor Users' Association.

PNEUMATIC TIRE OMNIBUS IN BUFFALO.—The Pierce-Arrow Motor Car Company has put in service at Buffalo a 2-ton omnibus running on pneumatic tires. The steel body seats 25 passengers.

FROM OMNIBUSES TO AEROPLANES.—Mr. F. Searle, who will be remembered as a pioneer in the operation of motor omnibuses in London, has been endeavouring to form a syndicate to place on a permanent basis the Airco (D.H.) airplane service between London and Paris.

MOTOR TRADES DEBATING SOCIETY.—The inaugural meeting of this society was held at the Road Club, Coventry Street, W., on December 9. Mr. J. P. Holland, 1, Newman Street, W.1, was appointed hon. secretary, and the annual subscription was fixed at two and a half guineas.

THE LIMIT OF EXCESS PRICES.—Recently the Health Committee of Glasgow Corporation accepted the offer of a local firm to supply a new ambulance body at £275. The firm afterwards asked for an increase of £25, but the committee reported that they were unable to entertain this application.

FACILITIES FOR TRAINING DRIVERS.—The principal of the Technical College has asked the Bradford Education Committee to provide facilities for partially trained ex-service motor mechanicians from the College to train as drivers on the motor vehicles of the tramways department. The matter was referred to the general manager of the tramways.

EMERGENCY PASSENGER TRANSPORT.—Messrs. Edward Wood and Company, Limited, have applied to Stretford Urban Council for permission to use a steam wagon and two trailers for the purpose of conveying employees from their works in Trafford Park to the Trafford Road entrance. As a temporary convenience the application was granted, but subject to not more than one trailer being allowed.

MINISTRY OF TRANSPORT AND STREET REFUGES.—The Ministry of Transport notified the local authority that they have had under observation the effect on traffic generally of the refuges recently erected in Old Kent Road, near Marlborough Road, and are of opinion that these refuges tended to cause confusion, thus becoming a source of danger. The Ministry therefore suggested the removal of the refuges.

REAR WHEEL GUARD LITIGATION.—The House of Lords has decided that the patent of the rear wheel guard fitted to the London General Omnibus Company's vehicles is invalid for want of subject matter. In the original action in the King's Bench Division, a similar judgment was given, but on an application to the Court of Appeal that decision was reversed. The House of Lords' decision was unanimous.

MOTOR TRADE STATISTICS.—The value of motor cars imported during the eleven months ended November 30, 1920, is given in the Board of Trade returns as £22,018,000, while the exports were

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MOTOR TRAFFIC

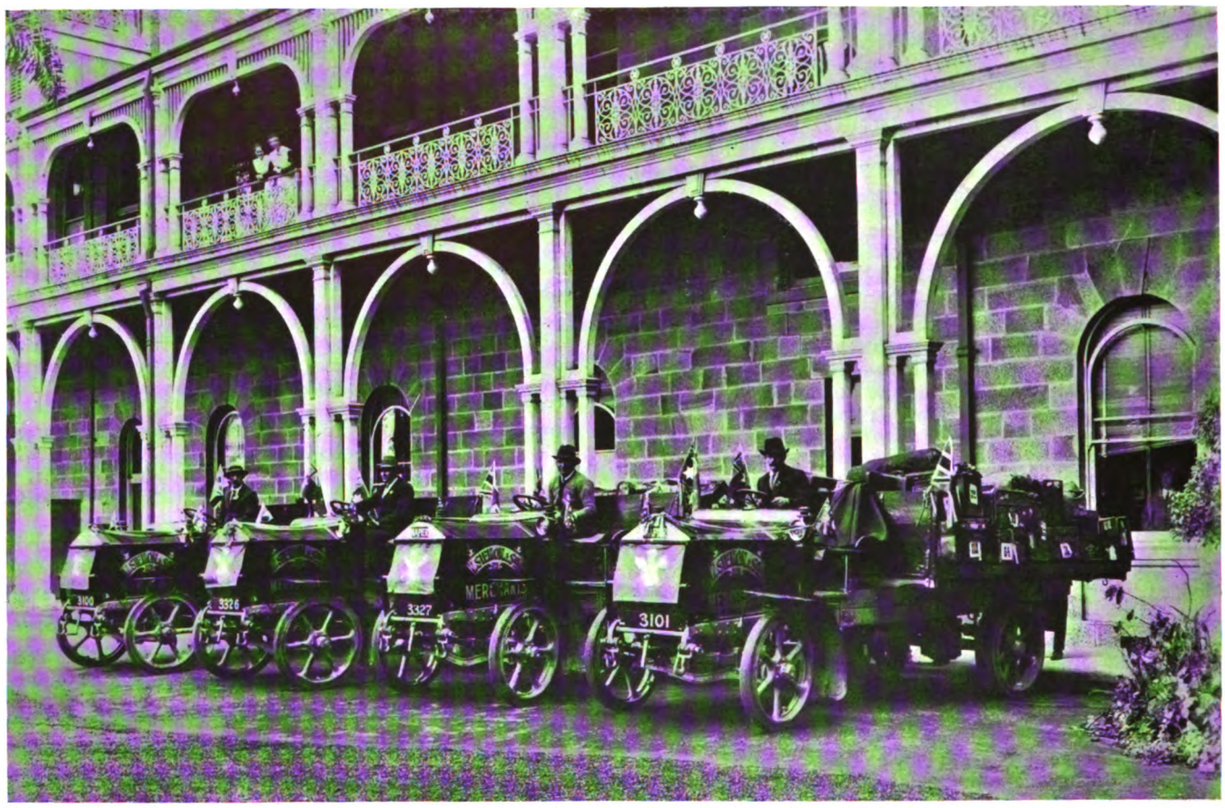
valued at £7,435,000. The imports of motor tractors were valued at £660,000, and the exports at £931,000. It is stated that there are many cars from the U.S.A. stored at British ports for which there is at present no market.

OMNIBUSES AT DETROIT.—The operation of omnibuses by the Detroit Omnibus Company since June 11 has proved so successful that on November 1 twenty-seven vehicles were in service, and the fleet is to be augmented by fifty machines immediately. At the start only eight vehicles were utilised. On account of the congested state of the electric street car traffic the omnibuses are expected to prove a great advantage during bad weather.

NAPIER LORRIES AT WORK IN BRISBANE.—The illustration below shows a fleet of Napier 2-ton lorries owned by Messrs. W. S. Siemen and Son, of Brisbane. The view was taken on the departure of the Prince of Wales and party from Brisbane, and depicts these lorries at the rear of Parliament House, Brisbane.

NO "B" TYPE TO BE LICENSED IN LONDON.—In order that persons who are contemplating the purchase of discarded chassis of the "B" type of the London omnibus, with a view to run them as omnibuses, may not incur disappointment, the Commissioner of Police announced on December 26 that he will not licence these in the metropolitan area. He reserves the right to make exceptions (a) in the case of persons who prove that before the date of the notice their negotiations for purchase had progressed so far that they could not withdraw without serious loss, and (b) generally, if he is satisfied that the decision militates against the reasonable requirements of the public for transport.

DAMAGE BY HEAVY TRAFFIC.—At the Sewage Disposal Committee of the Glasgow Corporation there was submitted a letter from the manager reporting the breakage of manhole covers and frames by the transit of excessive weight of traffic between Messrs. Harland and Wolff's works, Lancefield Street, and Finnieston Wharf. The



Napier Lorries at Government House, Brisbane.

OMNIBUSES IN MONTREAL AND WINNIPEG.—The Canadian correspondent of *Motor Traction* reports that the Toronto Transportation Commission, which is arranging to take over the street railway system, have decided to spend £200,000 on motor omnibuses. The Winnipeg Street Railway Company are operating single-deck omnibuses as feeders. The chassis is a 1½-ton Sterling, and the body seats twenty passengers, while 15 persons are allowed to stand. The entrance is at the driver's seat, so that one man acts as driver and conductor. At the rear there is an emergency exit, operated by a ever at the driver's left hand.

CHARS-A-BANCS COMPETITION.—At a recent meeting of the Manchester City Council, when an application was received for the licensing of a chars-a-bancs service between Manchester and Stockport, Councillor Wallhead remarked that they were setting up motor competition against their tramway cars, and he objected to this new principle being introduced in this way. It was urged that in the event of a strike the motor service would be useful, and the Lord Mayor observed that the Corporation had to look after the citizens as a whole. The Council referred the question of licensing back to the Watch Committee.

town clerk reported that an action, at the instance of the Corporation, is at the present time before the Court of Session on the subject of responsibility for damage to street paving by heavy traffic, and it was agreed to recommend that Messrs. Harland and Wolff, Limited, be held responsible in the meantime for the damage to the said manholes and frames, pending the result of the action.

LONDON OMNIBUS AND TRAMWAY STOPS.—Recently the Camberwell Borough Council asked the Ministry of Transport and the Commissioner of Police to make a stringent regulation that throughout the borough the stopping places for omnibuses shall be at least 30 yards in the rear of the tramway stopping places. A reply received from the Ministry of Transport states that the Technical Sub-Committee to the Advisory Committee on London Traffic have had the resolution under consideration, and are of opinion that it is not practicable to fix for general application a minimum distance between the stopping places of tramcars and omnibuses, and that each point must be considered on its merits; further, that the question of the rearrangement of stopping points throughout the metropolitan area is under the constant consideration of the Sub-Committee.

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THE
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WITH MOTOR TRAFFIC SECTION

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SHEFFIELD CORPORATION'S STANDARD CAR.

A LARGE BODY CARRIED ON A SINGLE TRUCK.

Attention will be attracted by a number of features apparent in the photographs and plan of the new type of car adopted for Sheffield Corporation Tramways, reproduced on this and following pages. These details are the more interesting because the new car has been constructed to the design of Mr. A. R. Fearnley, the general manager of the city's tramway and motor omnibus undertakings, who has devoted a great deal of study to meeting the special needs of urban service.

Latest Type of Sheffield Corporation Tramway Car with Enclosed Platforms.

The most striking aspect of this type is that it affords seating accommodation equal to the body of a car mounted on bogie trucks, although the body designed by Mr. Fearnley is carried on a four-wheeled truck. The capability of the latter to bear so commodious a body is explained by mentioning that the truck is of the Peckham pendulum design. Its suitability for the burden is not a sudden discovery, as the first one was put in service in June, 1913; and there are upwards of one hundred of these trucks in service at Sheffield or on order. Moreover, similar trucks stood the strain of the particularly heavy munition traffic in the Sheffield district during the war.

The builders of the new car are the Brush Electrical Engineering Company, Limited, of Loughborough, who

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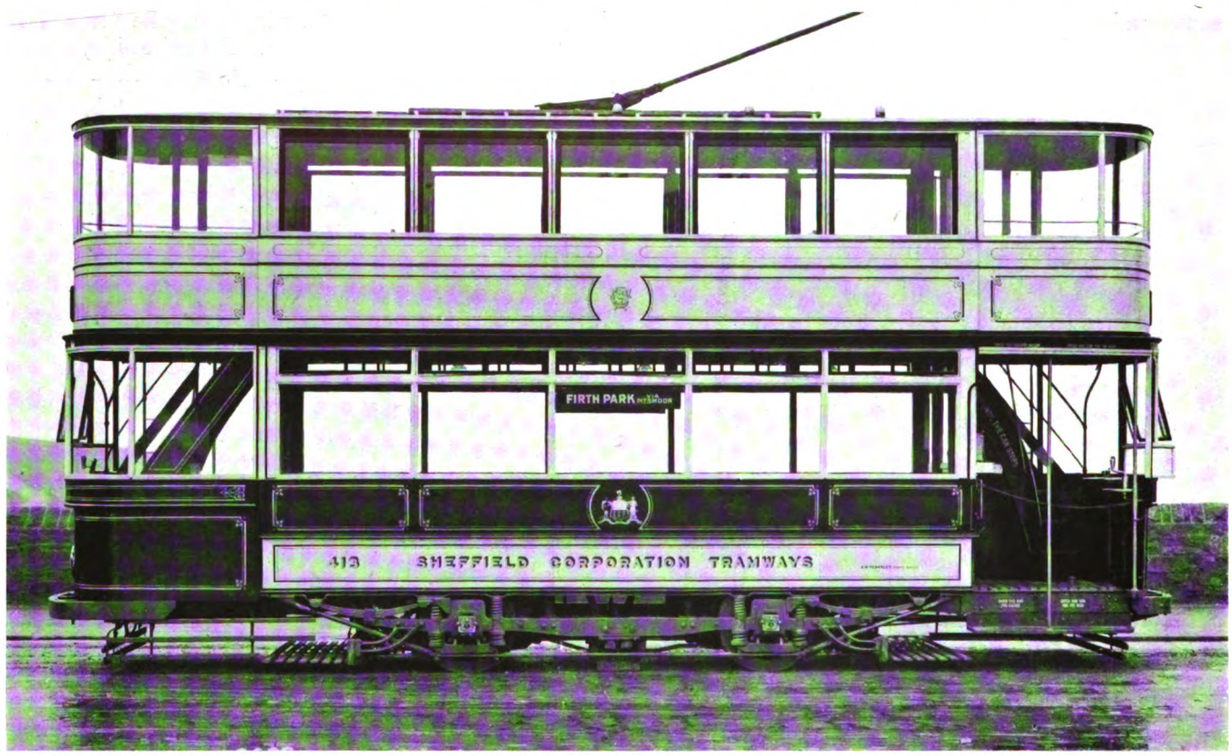
have received a contract for the construction of 75 vehicles, half of which are now complete and in regular service. Besides its passenger capacity other features are worthy of note. Not only is the lower saloon provided with vestibule ends to the platforms, but the upper deck is totally enclosed, the whole of the seats being under cover, thus giving maximum carrying capacity even in the worst weather. The car is arranged to accommodate 28 passengers seated on longitudinal seats in the lower saloon, and 48 in the upper saloon, 16 of the latter being seated on the end canopies, eight at each end.

As before remarked, the bodies are much longer than is usually the case with four-wheel cars, and the plan and section give particulars as to dimensions, both as regards lengths, widths and heights. It will be seen from the accompanying photographs that the car has a handsome and imposing appearance. Partially enclosed platforms give protection to drivers and conductors, and, indeed, everything possible has been done to ensure not only a thoroughly serviceable car, but comfort for passengers as well as for the attendants.

Consideration has also been given to the question of daily upkeep, and with this idea in view, all interior mouldings, cappings, etc., are of such patterns as will reduce the possibility of dust accumulation to a minimum. The top deck Kavanagh seats are arranged in such a way that they can be removed bodily to allow of the whole of the decking being thoroughly washed, preventing the accumulation of dirt and moisture round the bases of the seat legs. In twelve of the cars a trial has been given to the Rayner type of top deck seat which has previously been described in these pages.

It will be noticed that curved glass is used round the ends of the car, both for bottom and upper saloons, this being of selected polished plate carefully bedded into the framing. The main framing for the lower saloon is principally of Rangoon teak, ash being used for the upper saloon. The panels are of mahogany outside, with the exception of those round the curved ends, which are of sheet steel. Pitch pine is used for the floors for both top and bottom saloons, whilst wainscot oak has been adopted for interior woodwork, such as seats, panels, doors, mouldings, pillar cappings, etc. The inside panels round the curved ends of the upper deck are of aluminium, grained to match the interior finish, whilst the ceilings for both saloons are of selected birch plywood finished in the natural grain.

The side windows for the body are fixed, whilst those for the upper deck are arranged to lower, being mounted in teak frames, and arranged to rest on Laycock's lazy tong window fittings, working in conjunction with a rack-and-pinion arrangement. Ventilation is provided by means of teak glazed frames over side windows of the body, these frames being pivoted and arranged to open outwards, the movement being regulated by special screw fittings. In addition, perforated panels are fitted over the end windows. Ventilation for the upper deck is provided by means of six "Eros" extractors. Spring roller blinds are fitted across the ends of the car body to prevent the light from the interior causing objectionable reflection on the driver's screen at night, and the driver's screen is so arranged that the centre window may be opened as desired.



Side View of Sheffield Corporation Car, showing Arrangement of Staircases and Platforms.

In order to give as much platform space as possible, the brake handle is carried well forward against the dash, and a specially curved piece of polished plate glass is fitted to allow for the movement of the driver's hand when swinging his brake handle round. In addition to the usual hand brakes, the Sheffield type mechanically-applied track brakes are fitted, the platform gear being of the concentric pattern, including polished brass hand-wheels. The usual accessories are provided, such as platform commode handles and stanchions, window guard rods, waste ticket boxes, platform guard

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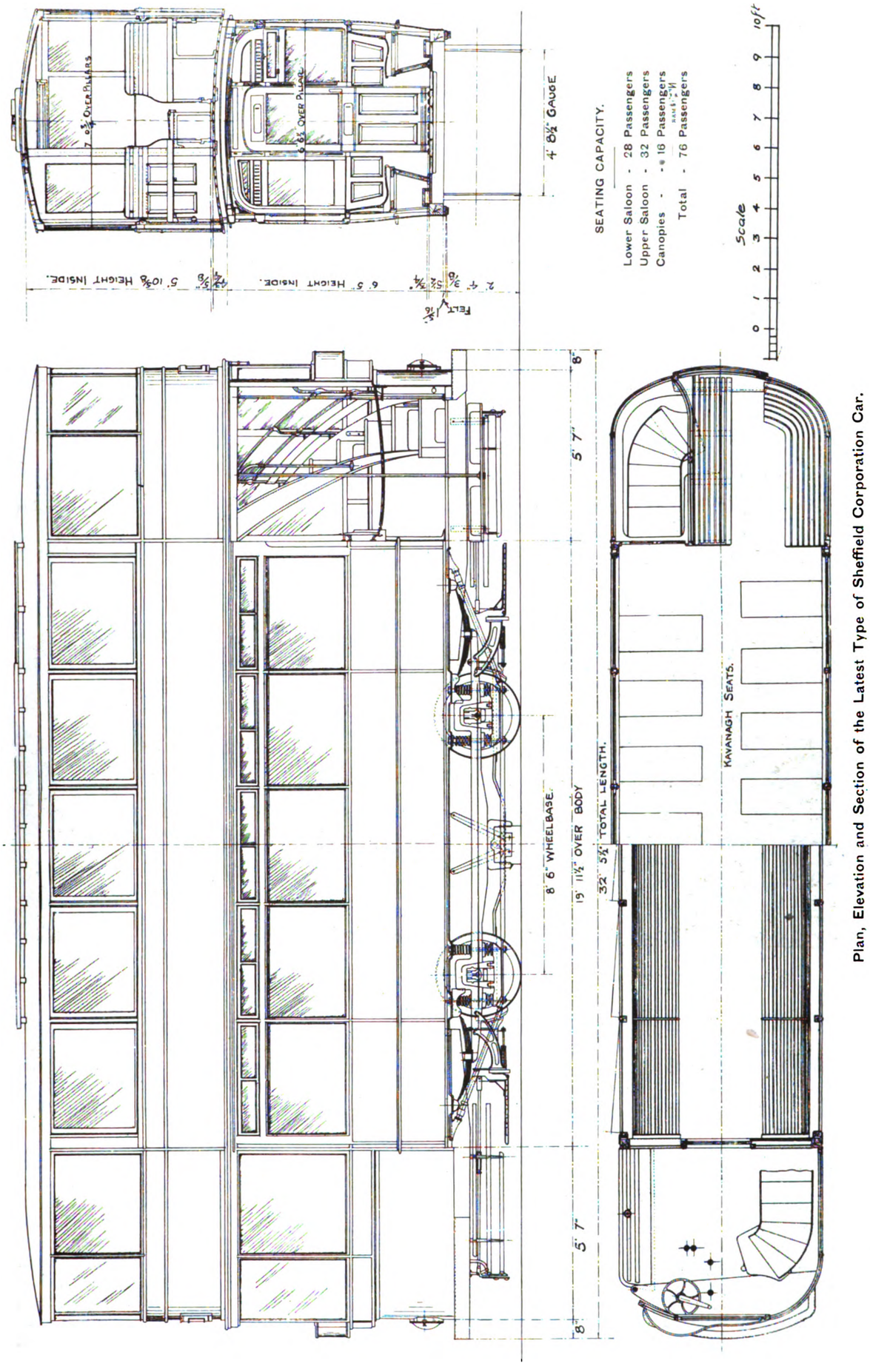

Plan, Elevation and Section of the Latest Type of Sheffield Corporation Car.

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chains, collision fenders, lifeguards and sideguards, headlights, signal lights, pedal gongs, Taylor's sanding gear, tool lockers, handpoles, straps, and similar details.

Four destination indicator boxes are fitted per car. These are of the Sheffield standard pattern, one being fitted at each end in the top-cover end framing, so arranged that it may be operated from inside, whilst there are two side indicators inside the body, all four being of the roller blind type.

As already stated, the trucks used are of the Peckham pendulum type, the wheel base being 8 ft. 6 in. in length. It will be noticed that extension trusses and brackets are provided, the brackets being placed near to the ends of the body. The motor suspension gear is of a special flexible type, in accordance with the Brush Company's design. The wheels are of Messrs. Hadfield's manufacture, fitted with cast-steel centres, mounted on axles turned from Firth's nickel chrome steel.

The cars are painted in the Sheffield standard colours; the main waist panels and dashes in ultramarine blue, and the other panels in cream colour, lined and transferred in gold and colour.

Speaking generally, the whole of the fittings and accessories are in accordance with the Sheffield Corporation standard patterns, and the car body underframe also complies with standard designs, including their own special trussing arrangement. It is interesting to note that the main members of the underframe are of timber, and that a steel underframe is not fitted. This arrangement certainly adds to the neat appearance.

The electrical equipment consists of two G.E. 203, 45-H.P. interpole ventilated type of motors, British Thomson-Houston B 13 type controllers, and trolley bases of the Brecknell, Munro and Rogers type.

LONDON ELECTRIC RAILWAY COMPANY'S NEW CARS.

NOVEL ARRANGEMENT OF DOORS.

The London Electric Railway Company some time ago ordered from Messrs. Cammell Laird and Company 40 new trailer cars for service on their Great Northern, Piccadilly, and Brompton line. Some of these are now in service, and it is expected that before long all of them will be delivered and running. Some of the cars hitherto in use on the line will be used for helping to build up six-car trains as required during the rush hours on this and other lines of the company.

The new cars, which cost in all about £120,000, are to be used exclusively on the Piccadilly line, and some old cars which are displaced will be used to strengthen the service on the Bakerloo and Hampstead lines. Hitherto the normal length of train was five cars, although a few of six have been run. The new cars have each an overall length of 50 ft., and their principal dimensions are identical with those of the old, as the limitations of the tunnel preclude any possibility of lengthening or increasing the height. Longer cars would not get round the curves. The cars have elliptical roofs, this being the practice in connection with all cars recently ordered, although the majority of the stock still has the monitor roof. The bogies are also identical with those already running.

Double Side Door Closed. Double Side Door Open.

London Electric Railway Company's New Cars.

The special feature of the new rolling stock is the doors. For a long time past it has been evident that the original arrangement of doors on tube railway cars was inadequate to deal with the crowds of passengers, and the introduction of a small central swing door, while relieving the congestion to some extent,

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failed properly to solve the problem of rapid loading and unloading of passengers. A careful study with models of permissible door arrangements was made, and as a result the new cars are fitted with a very wide double centre door and a single door at each end. The middle door has been designed with the idea that four people abreast can enter or leave the car, but the end door will allow one passenger only to enter or leave at a time, as the limitations of the seat box for the bogie would not allow of a bigger door. The ends of the cars are completely vestibuled. For the first time in the history of tube railway working sliding doors have been installed, but on account of the small height of the car imposed by the size of the tunnel it has been necessary in using a sliding door to bend the top of the door into the car roof, so as to give the necessary head room. The result is that the actual entrance consists of door and a part of the side of the roof. That applies alike in the case of the centre doors and the end doors, all of which work on the sliding principle. This particular feature is well shown in some of the illustrations given herewith. On account of this peculiar door construction it was impossible to hang the door in the ordinary way from the top runner. The weight of the door is carried on large-sized ball-bearing wheels on the bottom door track, while the ball-bearing rollers at the top of the door are merely guides.

The doors are all operated pneumatically by an engine, which was designed by the engineers of the railway company, and which presents some novel features. The front edge of each door has been made of a resilient character. Experiments in connection with this sensitive edge are not yet quite completed, but as originally installed on the four cars which were first delivered the sensitive part consists of a channel section front edge connected to a rod operating through the door itself to the back of the door on to a clutch mechanism. If a door in closing strikes a passenger, the sensitive edge is pushed back somewhat and operates the clutch, which in turn operates a rod connected to a three-way valve. The function of this valve when operated is to reverse the action of the door, so that when a door in closing strikes a passenger it automatically reverses itself, goes back to the end of its travel, and then starts closing again. As a result of experience since the first cars were delivered in December, further experiments are being made with a view to rendering the sensitive edge still more sensitive, that is to say, to make the door reverse its motion with a lighter blow than was necessary with the original apparatus.

At present on the London Electric Railway there is a gateman on every gangway, but with trains made up of the new type of cars it is expected that the number of gatemen will be reduced to two per train, namely, one on the rear gangway and one on the gangway of the forward motor car. Hitherto five gatemen have been required for a six-car train.

The method of working is as follows. The rear gateman before starting the train pushes a button which operates an electric valve on each car and closes all the doors with the exception of the rear door on the front motor car, which is separately controlled by the gateman on that car. On each door is fitted a brightly painted yellow semaphore arm, which juts out when the door is open, but which is forced down flat to the side of the car by the door in closing during the last half inch of its travel. On receiving the signal from the rear gateman the front gateman looks along the train to see that all the yellow semaphore arms have been pushed down, the fact that any one has not been pushed down being an indication that that door is not closed. On seeing that all semaphore arms are pushed down he closes his end door, which is separately controlled from his platform, and gives the signal for the train to start. By this means, with the aid of the ordinary station platform staff, it is hoped to reduce the length of station stops at busy stations very materially, mainly, of course, on account of the greatly increased door accommodation which is provided.

Interior View of London Electric Railway Car.

Side View of new London Electric Railway Car, showing Arrangement of Side Doors.

The early running of a six-car train of this kind was effected by using the four trailer cars which were first delivered and adapting two of the existing motor

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cars to the new door arrangement. As a result of the experimental running with this train the company considered that certain modifications were desirable in the remaining new cars which are being delivered.

In regard to the interior of the cars, the cross seats have been abandoned, and the seats are longitudinal. They provide accommodation for 48 passengers. This compares with 54 in the case of the old cars, six seats being lost because of the big middle doors. A great deal of attention has been paid to the design of the seats, which are upholstered in pegamoid. As a result of experiment a seat has been designed which is comfortable while the passenger is sitting upright, but it is claimed that the arrangement is such that to be comfortable the passenger must sit upright, and as a consequence the feet of seated passengers must be drawn in, and therefore there is not the same amount of blocking of the standing area as is so often the case where the passenger, by the design of the seat, is encouraged to sprawl. The front of the seat is about two inches higher than the back, while the back does not quite come down to the level of the seat.

Special attention has been given to the lighting scheme, and it is claimed that the illumination at the level of newspapers read by seated passengers is practically uniform throughout the car. The light is derived from electric lamps arranged along the centre of the roof. Emergency lighting is obtained from a storage battery which comes into operation automatically in the event of any failure of the ordinary supply. The interior of the car above the waist is painted in cream colour, so as to give an even better reflecting surface than hitherto, and in order further to improve the reflection of light roof advertisements are restricted.

The cars are, of course, entirely constructed of steel with the exception of the window sashes and the inside roof, which is of asbestos material.

The last previous innovation in the tube railway car doors was that on the joint stock of the Baker Street and Waterloo and London and North Western Railways, which began to come into service about a year ago. That design was ordered in 1913, but delivery was delayed owing to the war till January, 1920. Those cars, which were described in our pages at the latter date, have centre single doors and end single doors, all of which are hinged and open inwards. The full number of gatemen is required.

SANDBERG'S "INSITU" RAIL HARDENING.

The Sandberg "insitu" rail hardening process was patented and introduced during the war by Messrs. C. P. Sandberg, the well-known consulting engineers, with the two-fold object of decreasing the wear on tramway rails already laid in the track and retarding the development of corrugations. The process has been subjected to severe practical tests under ordinary service conditions, on a number of the most heavily worked tramway systems in the kingdom, and may now be said to have justified what were probably considered at the time the somewhat optimistic claims of the patentee. It is now over three and a half years since the first lengths of rail were treated in Leeds, and the first contract, consisting of a mile and a half of single track for the Croydon tramways, to the order of Mr. E. F. Morgan, the borough road surveyor, was completed during 1918. Up to date, orders have been placed with Messrs. Scholey and Company, Limited, the licensees and contractors for the process in the United Kingdom, for the treatment of 130 miles of single track, about 100 miles of which have been executed on 22 of the principal tramways in the United Kingdom. An interesting feature in connection with these contracts is the number of

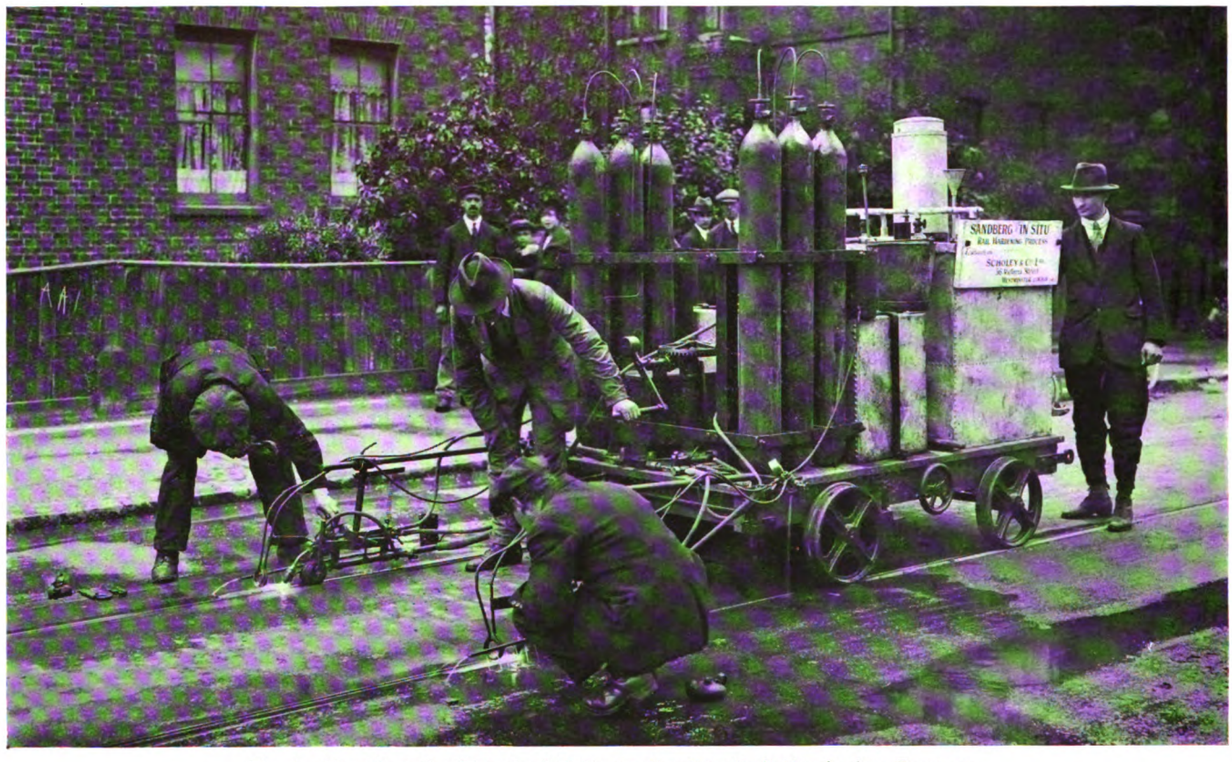

Fig. 1.—Treating the Tread of Rails by the "Insitu" Hardening Process.

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repeat orders, which amount to about 80 miles of single track, including orders of from 5 to 12 miles of single track for the Corporations of Liverpool, Manchester, Newcastle, and Leeds.

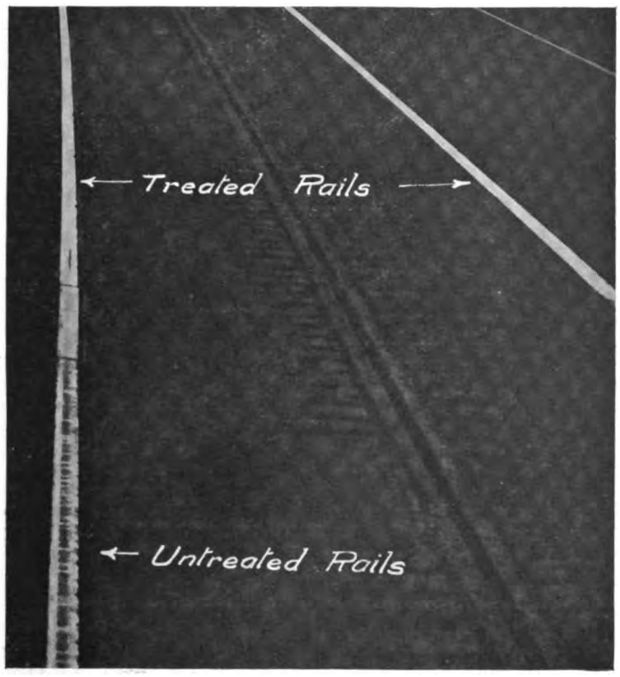

Fig. 2.—Treated and Untreated Rails.

In Figs. 2 and 3 the condition of both treated and untreated rails is shown. It will be observed that the untreated rails in each instance are corrugated, and that the treated rails have proved immune. In each instance all traces of corrugation had been removed before the "insitu" treatment was applied. The illustrations show the condition of the rails at the present time, after the passage of 200,000 heavy cars travelling at high speeds. Messrs. Sandberg do not by any means claim that the "insitu" process is an infallible cure for corrugation, as there are, of course, so many extraneous factors; their contention is that the development of corrugation is retarded to the fullest possible extent by the "insitu" treatment. The illustration in Fig. 1 shows the application of the "insitu" treatment being carried out by one of the latest equipments.

The extent to which rail steel can be hardened depends upon the composition of the steel, particularly in regard to the carbon content, but with rails of standard quality the hardness is increased by the "insitu" treatment from 190 to 600 (Brinell hardness number) and upwards; in other words, the elastic limit of the steel is increased from approximately 25 tons per square inch to approximately 100 tons per square inch, from which it is obvious that the resistance to detrusion and flow of metal is very considerably increased. The resistance of treated rails to wear is shown by the results of comparative gaugings over a period of twelve months on four of the most heavily worked tramways in the United Kingdom. The gaugings in question were taken by means of a specially designed instrument which records to within four-thousandths of an inch, and the average results in each case, after the passage of over 200,000 cars, indicated that the rate of wear on the untreated rails is from two to two and a half times greater than on the treated rails.

The inquiries received by Messrs. Sandberg from the Colonies and many foreign countries indicate considerable prospective development of the "insitu" process abroad. In view of the present high cost of track reconstruction, and the necessity for retrenchment, it would appear that the advantages to be obtained from the "insitu" rail hardening process should be very carefully considered by tramway undertakings both in this country and elsewhere.

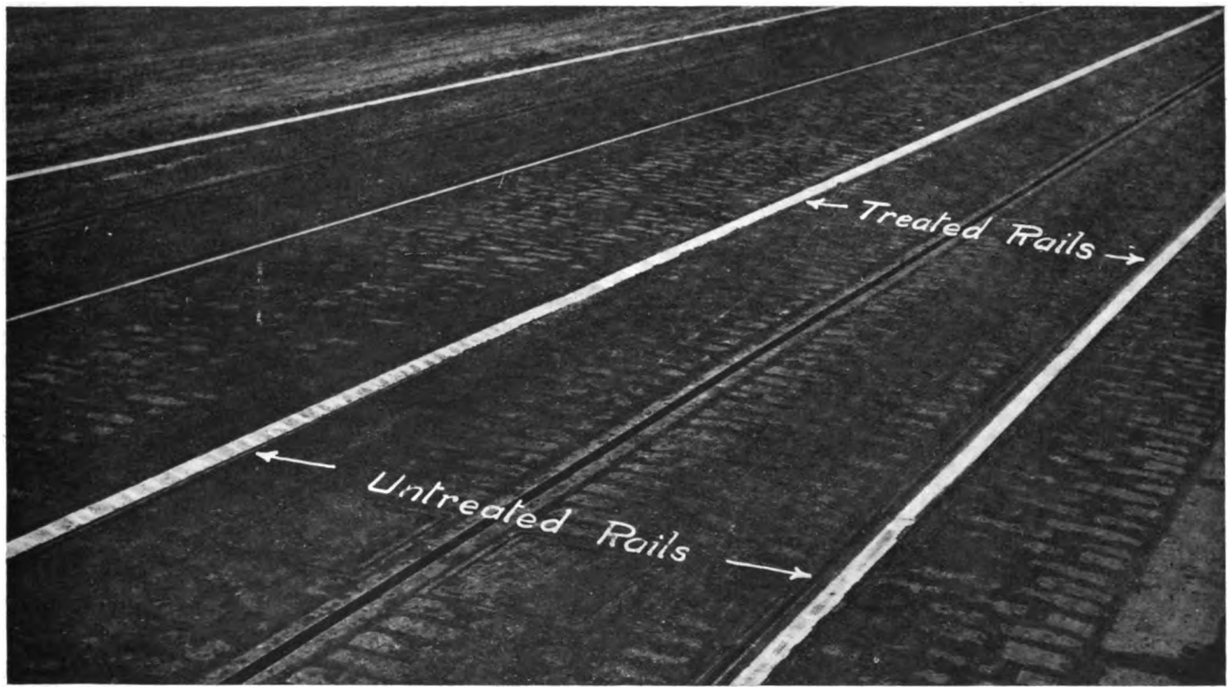

Fig. 3.—Portions of Rail Treated and Untreated—London Conduit Tramways.

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THE EDITOR will be glad to consider articles by experts. All information of a practical character relating particularly to the engineering and operating branches of transportation will receive prompt attention. Original illustrations will also be welcome.

LONDON, FEBRUARY 17, 1921.

Underground Railway Carriages.

The travelling public in London have good reason to be grateful to the underground electric railway companies for the remarkable efficiency of the services and for the efforts to improve the rolling stock. In spite of the inevitable difficulties arising out of the war and of the high cost of materials and wages, the companies continue to add to their stock of cars, and each new lot seems to be an improvement on what went before. The two main points to which the companies have directed their attention are the comfort of the passengers and the arrangement of the car doors with the object of facilitating loading and unloading. The latter point, of course, results in shorter stops at stations and higher average train speed. What may be called the more modern type of car was first introduced for through running between the Baker Street and Waterloo and the London and North Western Railways. Then the Metropolitan Railway Company put on a new type, and this was followed in November last by the Great Northern, Piccadilly and Brompton Railway. More recently still the Metropolitan District Railway began running new cars showing great improvements in methods of construction and details. A prominent feature in the coaches supplied to the various underground lines recently is the excellent lighting. The object has to a very great extent been attained of so diffusing the light that the passenger can read his newspaper no matter in what part of the car he may be seated. The owners of some tramway undertakings might well take a lesson from the underground railways in the matter of car lighting. Another feature is the abolition of strap-hanging; vertical and horizontal rods are provided on to which standing passengers can hold. Seats have been improved both in comfort and appearance, the very prevalent rattan upholstery having given place to pegamoid. We may point out finally that the increase by a large percentage of the number of cars in use means longer trains and less crowded trains during the rush hours, as well as a greater carrying capacity for the railways. In some cases at least the trains during the busy hours are now as long as the station platforms will permit. The most clamant reform now is the promised enlargement of the tunnels of the City and South London Railway. These tunnels are smaller than those of any of the other lines, and their "stretching" is needed so that more roomy cars can be provided. The work, however, means a good deal of expense, and times are not favourable for raising additional capital. Still, the companies concerned regard the matter as urgent, and the work is likely to be taken in hand as soon as possible. But for the war it would probably have been finished by this time.

Tram and Omnibus Through Bookings.

The decision of the London County Council to enter into an agreement with the London General Omnibus Company for a year's experiment with through bookings between tramcars and omnibuses is, for several reasons, highly interesting. The arrangement is for the present only to take effect at the Victoria terminus of the tramways, but if proved advantageous to the public it may be extended to the cases of other tramway dead-ends in the central area of London. The loss of time and money to the public arising from the fact that the tramways do not run through the central and west end districts is incalculable, and any arrangement which can be devised to reduce the evil must be welcome.

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An important point is that this agreement is the first attempt at co-operation between the two great street transport interests concerned. The omnibus company have in the past been more willing than the County Council to consider co-ordination schemes, but the latter body is hampered by a section of the political element which objects to have anything to do with undertakings carried on by the vitalising force of private enterprise. The issue of through tickets between the southern tramways and the omnibus routes in the west end, it should be observed, was proposed by the omnibus company. Two sets of circumstances have led up to the new scheme, and both of them arose last year. Following on the report of a Parliamentary Committee recommending the formation of a London Traffic Authority, the Minister of Transport, pending the carrying out of that proposal, was instrumental in inaugurating a series of conferences between representatives of the omnibus company and the County Council for the purpose of securing some co-ordination between the services. There was little practical outcome last year ; no agreement, for example, could be reached with respect to minimum fares. Last summer also a Committee of the House of Lords, in rejecting a clause in the County Council's Parliamentary Bill to enable the Council to run omnibuses to link up the central tramway termini, suggested that the Council and the omnibus company should negotiate with the view of getting the latter to provide such services. The conferences between the parties were accordingly directed to this matter, and the first fruits we now see. The outcome at present is not very great, but it may be a beginning of a much wider co-operation. The public stand to benefit, and it can hardly be supposed that the two transport undertakings will lose, as the number of passengers ought to increase. Meantime at least the through bookings will not apply in the case of workmen's fares and cheap midday fares on the tramways, but everything cannot be gained at once. An important concession by the omnibus company is that they will provide early morning omnibus services at Victoria to connect with the tramcars. Hitherto as a rule the company have not run omnibuses during the early morning hours when workmen's fares obtain on the cars.

A Decision Reversed.

Salford councillors are not to have free rides on the tramway cars after all. At the last meeting of the Corporation the Tramways Committee sought and obtained sanction to rescind the resolution passed in favour of granting free passes to members of the Council, and explained that the town clerk had advised them that such an issue would be illegal. This climax to a matter which has been agitating the minds of Salfordians for some months is not without its humorous side. Those who first brought forward the proposal must feel rather rueful in the light of what has happened, for their jubilation when they secured the adoption of their resolution was by no means concealed. This was not due, we hasten to add, because of joy at the mere possession of a free season ticket, but to the satisfaction which a protagonist feels after victory. The proposal of free rides for councillors had been hotly opposed, and was carried only by a narrow majority. The fight did not end here. After " the victory " the minority informed the world at large and the ratepayers of Salford in particular that they would not accept the free passes, and their names were published in the local newspapers under the heading " The Roll of Honour." The victors were just about to settle into their free seats, with the inward pride and apparent nonchalance of the new peer when told " My lord, the carriage waits," when the bombshell is dropped at their feet that the issue of free tickets would be illegal. The Salford town clerk says so, and every Corporation must obey the ruling of its town clerk in such matters or take the consequences. But why, the question was raised, did not the town clerk so advise the Council before the resolution was adopted ? But Mr. L. C. Evans, the town clerk of Salford, it seems, has offered advice to committees before, and has, he said, received " more kicks than halfpence for his pains." The Tramways Committee did not *ask* for his advice, and in the circumstances he did not offer it. He might have been ill-advised, he added, but under the schedule of his duties he was not to give advice to any committee or any member of the committee except upon the request of the committee. In this instance, he confessed, he was also guided to some extent by the view he then took that the Council

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would not adopt the recommendation to grant the free passes. No doubt Mr. Evans feels that all is well that ends well, while councillors who give their officials kicks rather than halfpence will feel less inclined to discourage the offering of advice. The incident is instructive, and it has a moral for tramway administrators elsewhere.

America and the Trackless Trolley.

Street railwaymen in the United States thought for many years that they had everything to teach to and nothing to learn from Europe in the matter of urban street transportation. So it was for a time. Cable tramways originated in San Francisco, although their originator was a Scotsman who had gone out there. Electric tramways with overhead wire conductors were developed in the States at a time when trolley wires would not have been tolerated in this country. Still we had a few very early specimens of electric traction with third rail or conduit construction, and we still have the City and South London Railway, the first electric underground line in the world, and at the time of its inception the greatest thing in electric traction ever known. Since those days British engineers have made notable contributions to the improvement of the mechanism of electric traction. In the development of mechanically-propelled road vehicles not running on rails America has been remarkably behind this and some European countries. The reason seems to be the same as that for the early development of tramways in the United States, namely, bad roads. The original tramway or street railway in America, on which the cars were drawn by horses, owed its birth largely to the villainous nature of the street and road surfaces of that time. By putting down rails, not only could the horses draw a heavier load, but the jolting of passengers was diminished. Even in later days road surfaces were not encouraging. So while the American worked hard on the pleasure motor car with pneumatic tires and sensitive springs, it was left to London to develop the motor omnibus, which is at length "taking on" in America, and may supersede the "pirate jitney" motor car. But quite as early as the days of the embryo motor omnibus were the beginnings of the trackless trolley omnibus in Europe. It began on the Continent, and it was slowly adopted to a limited extent in England. Why it has not been more largely adopted for suburban and other routes where the traffic is not sufficient to warrant the expense of constructing a tramway is something of a mystery. No doubt its time will come. The street railway fraternity in America are now waking up to the possibilities of the system for extensions of tramway routes and for other lines of light traffic. They are beginning to see—or some of them are—that here is a system capable of working as cheaply per car-mile as a tramway, but which requires no expensive track to be laid down. The capital required is small; the return is good. The working expenses are low compared with those of petrol omnibuses, but, as in the case of a tramway, the routes are fixed. So at the last convention of the American Electric Railway Association some attention was directed to the system as illustrated by a few small samples of it which exist in the United States. The subject is gone into more fully in an article to which great prominence is given in a recent issue of the "Electric Railway Journal" (New York), by Mr. H. L. Andrews, of the railway and traction engineering department of the American General Electric Company. Here we have a description of the various types of apparatus—better known in this country than in America—and the financial results of operation, including those from a number of English installations. The economy of the system compared with that of the petrol omnibus is emphasised, and a suggestion is made for carrying goods, the wagons so employed to have storage batteries to carry them on when away from the trolley wires. An arrangement of this kind was introduced in Bradford some years ago. Altogether, the Americans are being shown possibilities. British tramway men might advance their ideas on the subject also. Petrol is not likely to become much cheaper; electricity is, as the national electric power scheme develops. We have fairly good roads, even now, and they are going to be improved and new roads made under present arrangements. The trackless trolley seems to have a future of importance.

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THE INSTITUTE OF TRANSPORT

FIRST CONGRESS HELD AT MANCHESTER ON JANUARY 27th-29th, 1921.

The first annual congress of the Institute of Transport, which was held in Manchester from Thursday, January 27, to Saturday, January 29, was a highly successful and interesting occasion. No more suitable place for the first meeting of this vigorous institution could have been selected than Manchester, which is in the very centre of a gigantic system that includes all classes of transport. The holding of the congress at this time of the year was in the nature of an experiment, but the large attendance proved that the Council had laid their plans wisely. Very complete arrangements had been made by the local committee for the entertainment of the visitors, and excellent opportunities were given to them to see something of many of the great transport enterprises which have their centre in Manchester. The smoothness with which the proceedings were carried on from the opening of the congress to the finish was a tribute to the care and enthusiasm which the committee had devoted to their work. The programme began informally on the Wednesday evening with a reception at the Midland Hotel, which was attended by a large number of delegates.

Civic Welcome.

On Thursday morning the members were formally welcomed at the Town Hall by the Lord Mayor (Alderman William Kay), who expressed his pleasure that they had chosen Manchester as the scene of their first conference, because the business in which they were interested was of greater interest to Manchester at the moment than to any other city. The importance of the conference he thought was emphasised by the announcement that was made that morning that a committee had been set up to consider the question of carrying goods on roads by the railway companies. It would be a part of their duty to consider carefully such proposals as these, which would have a far-reaching effect, and give voice to their opinions in no measured terms. If ever there was a need for such meetings it was now, when it was necessary for somebody to say that such and such was the proper way to do things, and to impress this upon the most powerful Government we had ever known, and yet a Government which was unable to move for the want of a kick. He welcomed the conference, and looked forward to their administering that good kick to the Government. The transport position was very difficult, and it was necessary to bring about co-operation between labour and the employers of labour in regard to transport. Unless they could get men to realise the importance of fulfilling their duties and sink selfish interests for the good of the whole, the future would be a black one. On the contrary, if they would pull together the sound common-sense of the country would come out on top, and we should then be worthy of the sacrifices which had been made, and in the near future bring about a happier and a better England.

Sir Henry Maybury, K.C.M.G., C.B., who presided, acknowledged the welcome, and apologised for the absence of their President, Lord Ashfield, who unfortunately, owing to indisposition, could not be there. The Council, in selecting Manchester for its first provincial meeting, had done better than they anticipated, judging by the large number of acceptances. It would be their duty and pleasure to do all they could as an Institute to give effect to the suggestion that the Lord Mayor had made.

Before declaring the congress open, the chairman expressed the regret and sympathy of the delegates with those who had been bereaved and their condolence with those officials responsible for the Cambrian railway accident.

Letter from the President.

The chairman then declared the congress open, and the honorary secretary, Mr. H. E. Blain, C.B.E., read the following letter—

> It is with feelings of profound disappointment that, owing to indisposition, I have been constrained to forego the pleasure of attending the first congress of the Institute and of presiding at the meeting to be held by the courtesy of the Lord Mayor and Corporation of Manchester at the Town Hall on the 27th inst., when extremely valuable papers will be read and discussed. I am equally disappointed that I am debarred from participating in the visits arranged for your edification by our Manchester friends, and of sharing the hospitality of the Lord Mayor, the Tramways Committee, and the Manchester Ship Canal Company.
>
> As president of the Institute, I would tender to all those who have contributed to what I am convinced will be a most successful congress, and mark an epoch in the history of the Institute, my heartfelt thanks and warm appreciation of their services and hospitality, in which connection I must specially mention the magnificent work of Messrs. H. Mattinson and Arthur Watson (the local honorary secretaries) and their local committee.
>
> To every member and visitor present I would express the hope that attendance at the congress may result in very material benefit, both individually and collectively; also that the congress may redound to the credit of the Institute and prove—should proof be necessary—that it is emerging from infancy to virility, and will in the immediate future take its place with the foremost professional institutions and learned societies.
>
> Transport has aptly been described as the lifeblood of a nation. It is my firm belief that the Institute will shortly be regarded as one of the main arteries through which that lifeblood will flow to the heart of British industry and commerce; also that it will become a valuable and indispensable medium for raising the status of transport officials, and for training those upon whom the responsibility of the future development and direction of transport will fall.
>
> Sir Henry Maybury, K.C.M.G., C.B., has kindly consented, in my unavoidable absence, to preside at the meetings on the opening day. I am gratified to learn that he will be supported by other vice-presidents, members of the council, and many distinguished visitors, and that the gathering will include an eminently satisfactory number of representatives of all classes of the Institute. In this connection I am delighted that the Lord Mayor of Manchester will accord an official welcome to the delegates, and thus clearly demonstrate the more than ordinary interest evinced in transport by the great city of which he is the leading citizen.
>
> I am confident that what Manchester thinks of the Institute of Transport to-day the rest of England will think to-morrow.
>
> Ashfield, President.

At the chairman's suggestion it was agreed that Lord Ashfield's letter should be recorded in the Institute's proceedings. In connection with that the chairman said that it would be appropriate that they should refer to the announcement in the papers that morning that their distinguished honorary secretary (Mr. H. E. Blain) and another well known member of the Institute (Mr. Frank Pick) had been appointed assistant managing directors of the undertaking with which Lord Ashfield was associated.

Mr. E. F. Stockton, president of the Manchester Chamber of Commerce, who was called upon by the chairman, said that he felt it a great privilege that the congress had met in Manchester, for transport was the main artery of trade, and he knew of no more important trading centre than Manchester. It was the finest commercial city in the world. He thought that no area in the country stood to gain more by an efficient transport service than did Manchester. On those grounds they were indebted to the Institute for coming there.

Mr. C. de M. Gosselin then summarised his paper on "An Historical Survey of Road Transport," and he was followed by Mr. J. W. Smith, locomotive works manager of the Great Central Railway, who read his paper "Behind the Scenes in a Railway Locomotive Workshop." Both papers were profusely illustrated by lantern slides, and held the close attention of the assembly. A discussion of these two papers then followed.

Mr. H. H. Gordon, a member of the London County Council, who opened the discussion, said that if a common rumour was to be believed, a tremendous struggle of fratricidal war was going on between road traction on one hand and rail traction on the other, which had been dealt with in these two papers. As transport men they would remember that pregnant sentence used by their President at the inaugural meeting, "Our transport system of the future should develop on the basis of creation and not on piracy," a motto which should be recommended to all who were engaged in the different branches of transport. The future of their industry depended on the provision or the creation of new facilities, and not merely upon the ability to steal each other's traffic. The transport industry to-day had to reach a high standard of efficiency, and this could best be secured by development in two directions. One of

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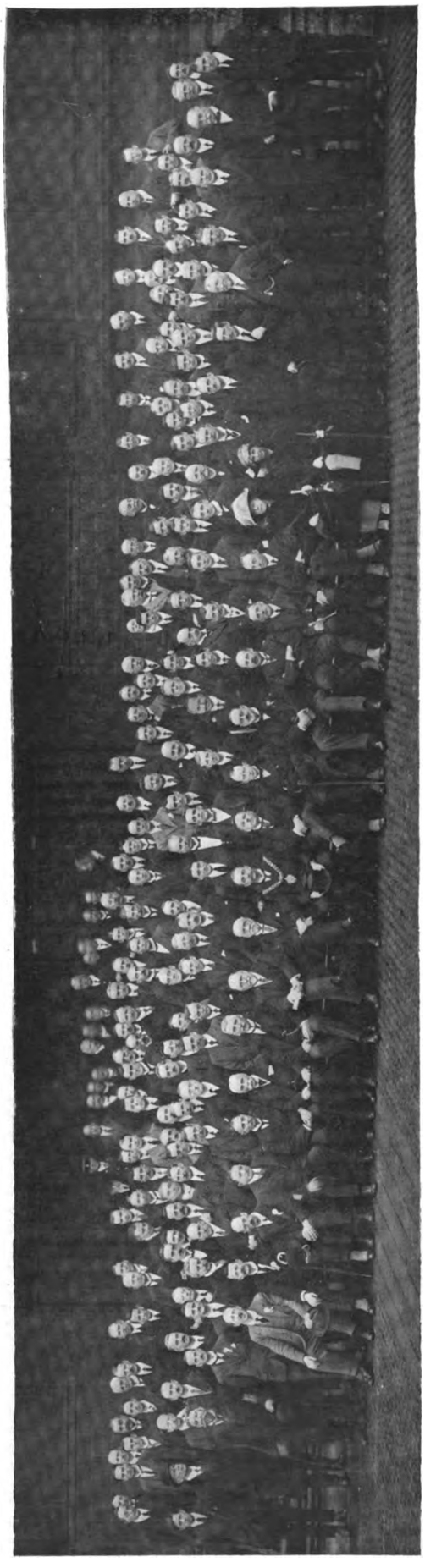

Congress of the Institute of Transport—Members and Visitors Photographed at the Town Hall.

(To the right of the Lord Mayor)—Sir Henry Maybury, K.C.M.G., C.B. (Vice-President), Major Joseph Nall, D.S.O., M.P., Mr. H. E. Blain, C.B.E. (Hon. Secretary), Mr. G. A. Dutfield (Member of Council), Mr. W. Wolsey (Member of Council), Mr S. E. Garcke (Member of Council). (To the left)—Ald. J. Bowes (Chairman of the Manchester Corporation Tramways Committee), Mr. Marshall Stevens, M.P., Sir J. Broodbank (Hon. Treasurer), Mr. W. A. M'Grath, M.B.E. (Chairman of Local Committee), Mr. Sidney Preston, C.I.E., C.B.E. (Member of Council), Mr. H. H. Gordon (Member of Council), Mr. C. Bentham (Member of Local Committee), Mr. T. A. Kenyon, M.B.E. (Assistant to Mr. Arthur Watson, C.B.E., Hon. Local Secretary), Major H. Mattinson, R.E. (Hon. Local Secretary).

The Lord Mayor of Manchester (Alderman William Kay) in the centre of the front row.

these was to increase the speed of traction ; the other was to eliminate as far as possible all intermediate processes of handlings. Each of the two papers read might claim to show the way in one or the other of these two directions. The great merit of motor traction was to eliminate duplicate handling. They would learn much in this direction from the visits which they would have the privilege of paying in Manchester. As the first step in the improvement of their transport facilities, there should be an imposition of a low speed limit. No vehicle failing to reach that minimum speed should be allowed to use the roads during the busy part of the day. The next step was to attempt to reach not a higher maximum speed, but to obtain a much higher average speed. Mere increase in speed would not produce that economy to which they must look forward for improvement in their systems. For the realisation of a higher efficiency they would have to go to the road and motor and to the mechanical engineers and ask for their aid. If they could increase the speed of transport they would save the manufacturers much money on account of the time their goods were lying idle, and they would make more use of expensive machinery. Great as had been the progress in the past, he hoped for more in the future, and he thought a happier England would depend on the extent to which they could carry out the programme of increased efficiency in the various transport undertakings.

Mr. H. Kelway Bamber, M.V.O., of the Leeds Forge Company, Limited, said he had listened with gratification to Mr. Gordon's speech, for what he had said laid at the root of the matter, that there was no need for fratricidal war between road and rail transport. When this country had returned to normal times the resources of both kinds would be taxed to the utmost. They were increasing the efficiency on the railways. It was appalling that the average load at home in these days was only 10 tons, while in South Africa and India it was 45 tons. An improvement in this direction, however, was being made, and his firm were constructing 50-ton wagons to carry bricks. He suggested that bigger wagons should be gradually introduced as the older wagons were put out of use in the ordinary course of things.

Mr. Sidney Preston drew attention to the importance of canal traffic, which Mr. Gosselin had described as the cheapest and also the slowest form of inland transport. He doubted if that was a correct description, as goods sent by canal from Birmingham could be delivered in London in from three to four days, and he doubted if any railway company would undertake it in that time.

Mr. R. C. Reynolds, O.B.E., traffic manager of the Bleachers' Association, referred to Mr. Gosselin's mention of the restrictions that road transport suffered by reason of the lack of legislative interest, and he thought that inasmuch as they had in the chair one of the principal directors of the Ministry of Transport, they would not have to suffer in the future from lack of efficient understanding. He appealed to all members not to be bigoted in their views of transport. There was room for all to extend and develop They wanted co-operation and not competition.

Mr. H. T. Chapman, county surveyor and engineer, of Kent, said he wished they could realise that surveyors were working under great difficulties. Railways would think they had a great problem if they had to alter their permanent way in order to carry four times the amount of traffic. That was what surveyors had to do on some of the roads. Surveyors did not wish to obstruct any possible type of traffic. They desired to bring the roads up to the standard required in order to carry traffic at the least possible expense to the public. It was a big problem, but they would endeavour to tackle it in the best possible manner.

Mr. N. E. Box drew attention to the height of the bridges. If there was a clearance of only 14 ft. 3 in. in most roads the traffic was much inconvenienced. He hoped surveyors would consider that.

Mr. J. Cracroft Haller, county surveyor of Nottinghamshire, said they could make the roads if they could get the means to do it. The biggest problem was undoubtedly the foundations. There were 236,000 miles of roads in this country, a large proportion of which have no foundations. If they thought that they could carry such traffic as had been suggested without putting in foundations they were mistaken, but it was all a question of finance.

Mr. Marshall Stevens, M.P., welcomed the members to Manchester, where they would find all forms of transport carried on, and also all sorts of vehicles. The difficulties of transport they had were in a great measure due to the want of co-ordination. That could only come as a result of the Ministry of Transport. On his way to the meeting that morning he had noticed a motor lorry from Bradford, one from Birmingham, and one from Liverpool. Yesterday a motor lorry had left at 2 o'clock, reached Birmingham at 11 o'clock, and delivered the meat when the market opened at 5 o'clock that morning. There was room for all kinds of transport if they all worked together, and the Institute had come at the proper time.

Mr. W. A. M'Grath, M.B.E., Rochdale Canal Company, thought that there was scope for co-ordination between railways and canals,

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and that such co-ordination would result in very great improvement to both interests.

Mr. C. F. RYMER, Liverpool, dealing with the question of road transport costs, said that road traffic was the baby of transport, and that it would work out many problems. He suggested that a committee of the Institute be formed to look into road transport and make recommendations for improvement to the general body.

Mr. T. KENYON, of the Lancashire and Yorkshire Railway, discussed the high capacity wagons, and said that for twenty-five years his company had had a considerable number of 20 and 30-ton bogie wagons, but the conditions here were very different from those in America. Traders here required goods to be collected one evening and delivered the next. As regards road traffic, he wished them to think what would be the result of taking the higher paying traffic from the railways. If they took that traffic from them the remaining part would have to pay a greater rate per ton. Whatever changes took place, there would be an absolute need for co-ordination.

Mr. GOSSELIN and Mr. J. W. SMITH replied to the discussions.

The third paper, entitled "The Problem of the Canals," was read by Sir John Eaglesome, K.C.M.G., general manager, Aire and Calder Navigation, and was one of much interest. After reviewing the rise and decline of canals, the writer referred to their later history, and touched upon the work of the Royal Commission. He then gave a very interesting account of the methods and traffic conditions, and outlined some suggestions for improvements. He thought there was a possible future for a very simple type of engine and crane, which could be worked by an unskilled man so as to make a canal boat self-propelling and self-discharging. The paper concluded with a consideration of the future of canals.

The final paper was read by Mr. J. Cracroft Haller, county surveyor of Nottinghamshire, and dealt with "Roads and Road Transport." This paper is summarised elsewhere. Mr. Haller emphasised the importance of building roads with adequate foundations to meet the future requirements of traffic. He estimated that the widening of 18,000 miles of first-class roads to 30 ft. would cost £200,000,000, and he put the necessary expenditure next year at £45,000,000. He urged that local authorities should pause before carrying out extensions of tramways, particularly at such constructional costs as at present. He thought the tramway companies had stayed their hands because the motor omnibus was a better paying proposition; but the reports of motor omnibus undertakings appear to indicate that Mr. Haller has not consulted the latest information on this point.

There was only a very brief opportunity for the discussion of the last two papers. Among the speakers were Mr. D. Ross Johnson, Sir Joseph Broodbank, Mr. E. S. Shrapnell-Smith, Major Nall, M.P., and Mr. Sidney Preston.

FORMATION OF THE NORTH-WESTERN DISTRICT OF THE INSTITUTE.

Before the close of the proceedings it was unanimously decided that a north-western district of the Institute should be formed, with headquarters in Manchester. The honorary local secretaries and the honorary committee which so successfully arranged for the congress agreed to act as a provisional committee to establish the new district.

Mr. H. E. Blain, C.B.E., honorary secretary of the Institute, in making the proposal, said that he was certain that everyone had been impressed by the enthusiasm in transport matters which was characteristic of the district. He had unfortunately to leave in the morning, but he did not wish to go away without seeing official steps taken to set up a north-western district of the Institute of Transport, and he believed the proposal would commend itself to the members.

The resolution, seconded by Major NALL and supported by Mr. WATSON, was carried unanimously.

Mr. H. E. BLAIN also proposed an "omnibus" resolution conveying the thanks of the delegates to the Lord Mayor and members of the Manchester Corporation, the Manchester and Salford tramways for free travelling facilities, to various friends who had lent motor omnibuses, to the Engineering Club for the hospitality extended to the delegates, and to the local honorary secretaries and the local committee. With reference to the latter, he said that he had never in all his experience had to do with local officers and a local committee that had performed such willing and efficient services as those that had been carried out during the conference. Another item in the resolution was to thank Sir H. Maybury for his occupancy of the chair. They were glad to see Sir Henry presiding there, not only because he was so prominent an official at the Ministry of Transport, but because he was a man who had the esteem and personal friendship of all who knew him.

Mr. SIDNEY GARCKE seconded the resolution, which was carried with acclamation.

The CHAIRMAN, in expressing his thanks, said that he was keenly interested in the Institute, being one of its founders, and he hoped to see it develop into a bigger and more useful organisation even than it had already proved to be.

Mr. W. M'GRATH, chairman of the local committee, also replied, and said that it was a pleasure to them to know that they had met the expectations of the members. A good share of the work had been taken by Mr. Kenyon and Mr. Mattinson, but they had all pulled together to do their best.

SOCIAL FEATURES OF THE CONGRESS.

On Thursday the delegates were entertained to luncheon at the Town Hall by the Tramways Committee of Manchester Corporation. The Lord Mayor presided, and he was supported by Alderman James Bowes, chairman, and the members of the committee. In the evening a conversazione was given at the Town Hall by the invitation of the Lord Mayor.

On Friday morning the delegates travelled by special cars of the Manchester Corporation Tramways to the Manchester ship canal docks, and from the docks they were conveyed by steamer to inspect the terminal facilities and several warehouses. On the return they were entertained by the chairman and directors of the Manchester Ship Canal to luncheon at the Midland Hotel, Mr. W. C. Bacon, the chairman, presiding.

After luncheon visits were paid to the train control system and school of signalling at Victoria Station, and to the car sheds and car-building works of the Manchester Corporation Tramways at Hyde Road.

On Saturday the visitors hzd the choice of a number of visits, including the Trafford Park Industrial Estate, the Lancashire and Yorkshire electric railway lines to Bury, Stuart Street generating station of Manchester Corporation, and the Liverpool Overhead Railway.

MECHANICAL ROAD TRANSPORT.
AN HISTORICAL SURVEY.

Mr. C. le M. Gosselin (Member of Council), managing director, H. Viney and Company, Limited, Preston, presented a paper bearing the above title. He said that the phenomenal success of mechanical road transport had been largely achieved through the remarkable development of the internal combustion engine. The development had been dependent on three main factors—(1) That legislation should be passed to give it a reasonable opportunity of using the roads; (2) That machinery should be devised suitable for propelling it on the roads; (3) That roads should be built which are capable of standing not only the new and heavier type of traffic, which mechanical traction implies as compared with horse traction, but the extra volume of traffic which mechanical transport was bound to bring upon them.

For sixty years in the nineteenth century, mechanical road transport was strangled through restrictive legislation. The Magna Carta of mechanical road transport was, however, contained in the Locomotives on Highways Act, 1896, which has more recently been revised by the Heavy Motor Car Order, 1904. Whilst these Acts give more freedom for the development of the motor car and heavy motor car (i.e., steam wagon and petrol lorry), the development of motor road transport has been effected largely in defiance of them.

From the following table of average speeds of varying types of traffic, it may be seen what a complicated affair our road transport is becoming—

Types of vehicles.	Speeds.	Types of vehicles.	Speeds.
Horse and cart or lorry	3	4 and 5-ton petrol lorry	18-20
Horse and trap	8	Petrol char-a-bancs ...	20-25
Cycle	10	Motor car	25-30
Steam wagon and trailer	10	Motor cycle	30-40
5-ton steam wagon ...	12		

Apparently there are something like seven different rates of speed, without having any regard to trotting-horse traffic and tramcars. Such is the traffic we meet on our highways to-day. It must be recognised by our legislators that the speeding-up of traffic is a national necessity, and that the question of the safety of the public can be dealt with more effectively by education than by restrictive legislation. The "Safety First" campaign no doubt will be extended to the provinces. As Sir Eric Geddes, the Minister of Transport, aptly put it on a recent occasion, "We have got to have an end of this old red flag and the man in front business—traffic has got to move faster than it does."

An examination of a few types of vehicles will show how they have changed their form with the development of the industry.

The author showed eighteen plates of steam vehicles, including Sir Goldsworth Gurney's coach (1828) running from Gloucester to Cheltenham four times a day, daily, for four months in 1831, having carried 3,000 persons and travelled 3,564 miles. It performed the journey of nine miles in 55 minutes—sometimes 45 minutes, or 12 miles per hour. It embodied many features of more modern practice, although only carried out by Gurney in a crude form.

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Thus the engine is reversible; the boiler a watertube boiler, not unlike a Babcock and Wilcox boiler, with super-heater, feedwater heater, and variable forced draught. Also, in 1831, a steam carriage was built, capable of obtaining 32 to 35 miles per hour, a remarkable feature of this vehicle being that it had a boiler pressure of 250 lbs. equal to the pressure of steam lorries in present-day use. It covered 800 miles without accident, and ran from Southampton to Birmingham, Liverpool and London with great success.

Coming to the days of the modern mechanical road transport vehicle, commencing roughly about 1900, plates were exhibited of, among others, a Leyland steam wagon in Liverpool trials, 1900; Thornycroft steam omnibus—the first London steam omnibus; Thornycroft steam wagon and two-wheeled trailer; present-day Foden wagon—representing overtype practice; present-day Leyland steam wagon representing undertype practice, and a plan of Leyland engine casing—depicting valve motion (Poppet valves operated by cams), and mechanical tipping gear.

The feature of outstanding interest is the advent of the internal combustion engine, together with the development of a suitable ignition apparatus known to-day as the magneto. The main development has been one of perfection of design and improvements in material. As examples, plates were shown of present-day Leyland petrol omnibus, Leyland char-a-bancs, Daimler chassis, and Daimler landaulette. The commercial vehicle, undoubtedly, forms the most important section of mechanical road transport to-day, and may be divided under three types—petrol propelled, steam propelled, and electrically propelled. The work performed by the three types may also be divided under three headings, viz.—municipal work, passenger carrying, and goods carrying. For passenger carrying, the petrol vehicle possesses great advantages in cleanliness and compactness of design. For goods carrying there is hardly any limit which can be set upon the possibilities. For journeys of 50 to 100 miles, probably the petrol lorry is the most economical proposition; for journeys up to 50 miles, the steam wagon and trailer. Regular services of steam wagons are successfully run to-day over distances of 200 miles in, and 200 miles out. For furniture removals of any distance, they are often more economical than petrol lorries, on account of their ability to draw a trailer. The boiler pressure of 200-250 lbs. is comparatively low and, before long, it is probable that pressure of at least twice this will be the rule of the day.

For general reliability, there is not much difference between the two motive powers. A steam engine will continue to work, however, in a very inefficient condition, whereas a petrol engine will rapidly collapse on losing its efficiency due to minute mechanical defects or overloading. The electrical vehicle is just commencing to come into prominence for loads up to 3-4 tons. For local hauls of 4-10 miles, it is the coming motive power. On the establishment of larger electrical power houses, with a reduced cost of electricity, electrical traction should, to a large extent, supplant the horse vehicle for retail and wholesale deliveries. It will play a prominent part in municipal work.

Another factor which has greatly accelerated the development of mechanical road transport is the improvement in the manufacture of rubber tires, now almost universally used. In 1910, a set for a steam wagon carrying 5 tons, cost 5d. per mile to run; to-day, a similar vehicle will haul 9 tons, at an average tire cost of, say, 3½d. per mile, both wagon and trailer being shod with rubber tires.

Various combinations of steam and petrol, and petrol and electricity, are being tried. The Still engine, which consists of a double-acting engine, one side of which is a petrol engine and the other a steam engine, is another combination which claims a thermal efficiency of 40 to 45 per cent., but is yet in the experimental stage.

The characteristics of a road suitable for motor traffic are (1) that it should have a suitable foundation, (2) that the surface should be impervious to wet and frost and be reasonably hard, (3) that the road should be made with the minimum of camber. These conditions are best obtained in (1) a sett-paved road, which is very expensive, (2) a tar macadamised road, which has the disadvantage of being very slippery for cattle in certain seasons of the year, and is unsuitable for hills, owing to the smooth nature of the surface, (3) a concrete road.

Perhaps one of the best practical examples which can be given to show the progress in road construction in recent years, is that, in 1906, it took much more power to haul 5 tons from Preston to Liverpool in six hours by steam wagon than it now takes to carry 10 tons in three and a half hours the same distance by a steam wagon and trailer.

Road transport will take an increasing share of the more valuable classes of goods over distances up to 50 miles, and in a certain number of cases up to 100 miles. Perishable goods, requiring promptness in dispatch, such as meat, vegetables, fruit, dairy produce, etc., can undoubtedly best be served by road transport within the distances named. Brewery goods, and other goods liable to pilferage, can also most conveniently be conveyed by road. The chief virtue of road transport lies in its freedom of movement, it is self contained, and the movement of each separate unit is unaffected by the rest. Being able to move directly from point to point, there is no intermediate transhipment of goods. This freedom of movement has not been sufficiently exploited by the dock authorities as a means of overcoming congestion. There is an opportunity here for the Institute of Transport to set up Local Committees of Dock Authorities and road transport representatives for the purpose of investigating the best use that could be made of road transport in connection with their systems during periods of congestion.

The advertising possibilities of mechanical road transport for the goods it carries are enormous, more particularly in thickly populated industrial centres.

For developing districts with minimum expenditure of capital outlay, road transport is unsurpassed, and, provided that it is not hampered by legislation or official control, it will not only supplant horse transport, but will carve a big hole into local railway services both for goods and passenger transport.

Despite the advantages mentioned, which are inherent to the use of mechanical transport, the crucial test which will decide the respective position of road transport in relation to the competitive forms of transport, will be that of cost of operation. As railway charges have been hopelessly camouflaged under a Government subsidy, it is difficult to give up-to-date comparisons.

One of the latest phases has been the establishment of a large number of Freight Exchanges, the object being to put the man with the goods to move, in touch with the vehicles available for performing the work. It has yet to be discovered how far they can be developed without undue interference with the efficient development of road transport by properly organised establishments.

In conclusion, it may be said there is a cloud of uncertainty overhanging the future of mechanical road transport, i.e., official control. There is reason to believe that, in official circles, it is considered that road transport cannot usefully compete with rail services, and it would not be difficult for the official mind to decide that the best means of preventing road transport from competing with rail services would be to place road transport and rail services under one direction, that of the railways. Given a free hand, road transport, scientifically applied, will revolutionise the transport facilities of the country.

ROADS AND ROAD TRANSPORT.

Mr. J. Cracroft Haller, county surveyor, Nottinghamshire, read a paper on "Roads and Road Transport." In Nottinghamshire, as in many other counties, the County Council has carried out the whole work of maintenance of rural main roads. Such centralisation of control produces much more economical and beneficial results. In order to appreciate the many points which arise in the provision of roads suitable for, and capable of withstanding, the traffic which is now crowded on to them, it is only necessary to instance the steel-tired traction engine, weighing, for licensing purposes, up to fourteen tons. The efficient road travelling weight of such an engine may be as much as seventeen or eighteen tons. Consider the effect on the road surface of such an engine, hauling several heavily laden trailers, regardless of adverse weather conditions. One train of this class passed through Nottinghamshire during the war. It consisted of four heavy traction engines, each drawing a propeller for a battleship, each propeller weighing twenty tons. This train travelled from London to Glasgow. Here one is faced not only with the question of a suitable surface, but the practical impossibility of keeping any road in repair, unless it is provided with strong and suitable foundations. In the majority of cases, existing roads have no adequate foundations for such traffic. In Nottinghamshire the main roads have a sub-crust of from four to six inches of boulders only. The speed attained by fast cars will disintegrate any surface not bonded together by some such material as bitumen, tar, or similar substance, forming a homogeneous and impervious surface.

The days are past when everything but light traffic can be looked upon as "extraordinary." It is for those who are responsible for the maintenance of our road system to see that the roads are constructed and maintained in a manner so as to facilitate not only the transport of goods, but of the travelling public, not even forgetting the char-a-bancs. The Ministry of Transport has taken up the question of the classification of the roads commenced in 1914 by the Road Board. It is hoped very shortly that the whole of the roads of the country will be classified as first, second, or third class. Under the Finance Act, 1920, new duties will be payable as from January 1, 1921, in respect of mechanically-propelled vehicles. It is estimated that these duties will raise a sum approaching £9,000,000 in the first year, and it is understood that this sum

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will be utilised to assist in the maintenance of first and second class roads.

In this paper, it is intended to deal mainly with roads called upon to carry long-distance traffic and a combination of long-distance and local rural traffic. In 1903, the first experimental section of tarred slag or Tarmac road, a quarter of a mile long, was laid. For the next five years, up to 1909, sections of road varying from three-quarters of a mile to five miles in length were laid each year. In 1909, the Road Board was created. With the aid of funds provided by the Board, the strengthening of main roads by means of surfacing with tarred slag was carried out on a larger scale. By the end of 1912-13, out of the total mileage of 408 miles of main roads in Nottinghamshire, 93 miles had been re-surfaced with this material, including twelve miles of the ancient Fosseway, which had for a great number of years been in disuse and almost derelict. In 1913-14, a much larger scheme for the strengthening of the more heavily trafficked roads in Nottinghamshire, not already dealt with, was prepared. This comprised the strengthening and re-surfacing of 114 miles of main roads at an estimated cost of £131,000, towards which the Road Board made large grants and further assisted by advancing the balance on loan. It was estimated that the work would be carried out in three years, and in 1914-15, thirty-two and a half miles of reconstruction on rural main roads were completed. Owing to the war, the question arose whether it would be better to proceed with the scheme or wait until peace. Knowing that serious deterioration would result to the roads if the work were delayed, and that much larger expenditure would be required to restore them, the writer advised that the work should be continued. The Road Board confirmed this view, and practically the whole of the work was completed by the end of 1917-18 at a cost of £140,500, which was an increase over the original estimate of only £9,500. The result justified the action of the Highways Committee in proceeding with the work, as, apart from the large expenditure which would have been required if the roads had been left in their 1913-14 condition, the work of the scheme could not have been carried out in the last two years at less than double the cost estimated in 1913-14, and at the present time it would be approximately three times the cost. At the end of 1918, there were 207 miles, or more than one-half of the main roads in Nottinghamshire which had been strengthened and surfaced with tarred macadam.

Of the 207 miles of road referred to, only some 40 miles are surfaced with tarred macadam the full width of the road, the remainder having been constructed with a tarred macadam centre with the sides of waterbound granite or slag, this being an attempt to provide a surface giving security of foothold in all weather conditions for horses. Like all compromises, it gave satisfaction to nobody, and in the schemes prepared since 1918, the roads are being surfaced the whole width with tarred macadam. A census of traffic on main trunk roads in Nottinghamshire taken during last year showed that horse-drawn vehicles comprised only 5 per cent. of the total traffic, the remaining 95 per cent. being mechanically propelled. Immediately after the signing of the Armistice, the Government, realising the importance of taking immediate steps to endeavour to make good the serious deterioration of the roads that had taken place during the war throughout the country, placed at the disposal of the Road Board £10,000,000 for the purpose of making grants, principally for the improvement of road surfaces. A scheme for Nottinghamshire was put forward for the re-surfacing with tarred macadam of 24 miles of main roads, and 41 miles of district roads maintained by district councils, including one road 31 miles in length, which will open out a direct road from Nottingham to Doncaster, and is really a by-pass road missing all the industrial towns and districts, and passing through only two villages.

This is one of the longest roads in the country to be dealt with in this manner ; when completed, it will be a through road for traffic from north to south, and will relieve the traffic on the roads through the congested industrial districts on the west of the county. This road is 60 feet in width between fences for practically the whole length, and thus will permit of considerable future development. The amount of what might be called capital money expended in Nottinghamshire on the improvement of road surfaces during the last ten years has been £316,000. This is apart from ordinary maintenance costs, which have increased from a net cost to the county ratepayer of £38,000 to £85,000 per annum.

New arterial roads 120 feet in width are an ideal to gladden the heart of every road engineer, but are roads of this character the most important subject ? Should we not rather first put into first-class condition existing roads, for there can be no question that, from the transport point of view, it is desirable to have the longest possible length of road in good condition ? The total mileage of roads in Greater Britain is approximately 236,000 miles. The Minister of Transport, a short time ago, stated that, so far as it is at present known, the classification of roads will have the result of placing, approximately, twelve per cent. in the first class, fourteen per cent. in the second class, and the remaining seventy-four per cent. in the third class. Taking these figures, it will mean that, in England and Wales alone, there will be 18,000 miles of first-class roads. To widen the carriage-ways of these roads to a width of 30 feet would involve at a moderate estimate, an expenditure of £200,000,000. It will be said that a road with a carriage-way of 30 feet is not of sufficient width to allow a tramway to be constructed, and with that contention I should agree, but, in my opinion, tramways outside towns cause obstruction and should not be permitted to occupy any portion of a road that is used by all other road users. If they are to be continued as a means of conveying passengers, they should run on a separate track. In Nottinghamshire, we have carried out the widening of a road in an industrial district from 27 feet to 70 feet between fences. The old road had a carriage-way of 18 feet in width only, the centre occupied by a single line of tramway. The new road has now a double tramway in the centre on sleepers, and a carriage-way clear of all obstruction on each side. This tramway is cheaper both in construction and maintenance than where the track has to be laid on concrete and the surface paved, even if the cost of land is included.

Dealing with the various materials used in road construction, he urged that the Government should control the export of tar or its residium. This export is the principal reason for the present scarcity and consequent high prices. The requirements of our roads, which are a national asset, should be supplied at a reasonable price. Turning to concrete roads he said a quality lacking in concrete is that of resiliency and elasticity. Some degree of resiliency is necessary for all types of traffic, and it is not obtainable in a road constructed entirely of concrete. Practically all the concrete roads laid in this country, and many of those in America, are treated with a thin coat of some bituminous material. This prevents abrasion and disintegration of the concrete but it does away with the claim that a concrete road would afford a better foothold for horses.

In considering the question of roads, an inseparable and important consideration is that of bridges and, in this direction, there must of necessity be a large expenditure in the next few years. A matter that has been of some concern to road engineers is that of weight and speed of mechanically-propelled vehicles. Up to the present there has been no clear definition of weight. What the road engineer wants to know is the maximum weight which any vehicle will put upon the road on any of its axles, and the law in regard to unladen axle weight requires alteration. The Ministry of Transport some time ago appointed a Departmental Committee on Taxation and Regulation of Mechanically-Propelled Vehicles, and I am empowered to say that the report of that committee as regards the speed and weights of these vehicles will contain recommendations on the following lines—

That the maximum weight of a traction engine shall not exceed eighteen tons ten cwts. when ready for the road, including fuel and water, and the maximum weight on the back axle shall not exceed fourteen tons. If the traction engine is fitted with a crane, or a driving drum, etc., the gross moving load shall not exceed twenty tons, the maximum weight on the back axle not exceeding fifteen tons.

That the speed at which this class of engine may travel at the present time of two miles per hour through towns and four miles per hour in the country shall not be increased.

That the maximum weight of a heavy motor vehicle unladen shall not exceed seven tons five cwts. as against the present five tons, and that the axle weight on an axle shall not exceed nine tons as against the present eight tons.

At first sight it would appear as though these recommendations would permit of still heavier vehicles than those at present in use, but this is not intended, nor do I think it will be the case. If the recommendations of the Committee are adopted, there will be concessions to the manufacturers and users of these vehicles, but we shall really know the maximum weight which any vehicle will put upon the road on any of its axles. If these weights are exceeded the offender should be subject to heavy penalties.

The new arterial trunk roads, in the majority of instances, could advantageously be constructed on the site of existing roads, by-pass roads being constructed to avoid having to pass through populous districts and villages where the existing roads are so frequently narrow and have dangerous corners. Much could be done in the near future in preparing for that new and wide road by seeing that buildings are not allowed to be erected close up to the highway, as they are in many instances at the present time. It is also important that power should be given to acquire land for the widening of existing roads and for the construction of new roads ; to prevent the formation of dangerous corners ; to improve existing ones ; to prescribe the nature and height of fences at corners ; to set back buildings ; to remove or alter existing buildings and to deal with trees, hedges, or high banks which obscure the view of approaching traffic ; to compel the cleansing of ditches, not only on the side

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of the highway, but the ditch or water-course that runs at right angles from the road and is the means of conveying water from the roadside ditches; temporarily to close roads for the purpose of repairs; to give fuller powers with regard to openings in highways, so that the highway authority should have full control of the subsequent reinstatement. With regard to bridges under or over railways, the width and height of the arch should be increased. At all corners a road should be given super elevation. On many roads, the camber is excessive and this, to a large extent, is the reason that heavy, slow-moving mechanically-propelled vehicles are so often found in the centre of the road obstructing faster-moving vehicles instead of keeping on the proper side. In these days when there are large numbers of steam wagons using the roads, it is not only an advantage to the driver, but it is better for the road, to provide a small turn-out so that vehicles may stand for the purpose of taking up water. By doing this, damage is avoided on the side of the metalled carriage-way. Drivers of these vehicles frequently take the opportunity when standing to clear out their fire and drop the clinker and hot ashes on the road which, if surfaced with tarmacadam, suffers considerably.

THROUGH BOOKINGS IN LONDON BY TRAMWAY AND OMNIBUS.

At a meeting of the London County Council on Feb. 1, the Highways Committee recommended the Council, by way of experiment for 12 months, to enter into an agreement with the London General Omnibus Company for the provision of omnibus services from the London tramways termini, and for through bookings between omnibuses and tramways, the experiment to commence at Victoria.

Mr. W. J. Squires, Chairman of the Highways Committee, in submitting the recommendation, said he was quite sure the Council would be wise to give the proposed system a trial, pointing out that the initial arrangement would be made simply as an experiment for 12 months. There would be very little chance of any future L.C.C. Omnibuses Bill being successful unless they made some attempt to meet the House of Lords' recommendations.

Sir John Benn said it was a pity to disturb this "happy wedding" of the L.C.C. and the L.G.O.C., but it seemed to him that it would be a wedding in which they, the L.C.C., would be "taken" very much "for worse." Such an arrangement, he said, would mean in the end municipal tramways controlled by a commercial organisation, and passengers would have no protection in the matter of fares. He moved an amendment making the proposed agreement conditional on the omnibus company's preparedness to concede cheap midday fares and workmen's fares similar to those obtaining on the Council's tramways.

The amendment was defeated by 30 to 18, and the Council adopted the recommendation of the Committee.

Under this scheme, as set out by the Highways Committee, both the Council and the Omnibus company will issue through tickets via Victoria at fares of 2d., 3d., 4d., and 5d., based on the addition of 1d. to the tramway fares. At this fare the passenger reaching the tramway terminus will be able to travel by any omnibus for a distance of a 1½d. stage from Victoria. The company has agreed to divert some omnibuses from Victoria Station so as to facilitate this interchange of passengers. It is proposed that on each ticket collected the company shall receive 1½d., and the Council the balance, viz., ¾d., 1¾d., 2¾d., or 3¾d., as the case may be. The company undertake to provide early omnibus services to connect with the Council's cars, but while accepting through tickets issued by the Council the company do not propose to issue through tickets in connection with workmen's fares or the 2d. midday fare, or make any reduction in their share of the rates which might be obtained from such tickets. In the circumstances the Highways Committee stated that they could not see their way to advise the Council to agree to the issue of through tickets in connection with workmen's or cheap mid-day fares.

The Committee recommended that a trial be given to a limited system of through tickets between the Council's tramways and the service of omnibuses, as indicated above. The question of a similar arrangement to and from other inner tramway termini is still under discussion and the Committee propose to report later in regard to any other arrangements it might be possible to make. The arrangement will remain in force for a period of twelve months, during which time both sides will have an opportunity to consider the position. It is hoped that the arrangement will assist in determining how far it is practicable by co-operation, as suggested by the House of Lords Committee, to meet the needs for which the Council had sought powers to run connecting motor omnibus services.

The Genesis of the Arrangement.

The events which brought about the arrangement now arrived at were those in connection with the Bill of the County Council to enable them to work omnibuses which was rejected by a House of Lords Committee last year. In an adjourned report by the Parliamentary Committee, which was also presented to the Council on Feb. 1, a narrative was given of the Parliamentary proceedings.

The following are essential parts of the report—

Omnibus Decision by House of Lords Committee.

The Highways Committee reported on July 13, 1920, that the Select Committee of the House of Commons had amended the London Council's Tramways, Omnibuses and Improvements Bill so as to restrict the powers sought by the Council to run omnibuses to a defined area in the central district of London in order to link up tramway termini within that area. Opposition to the Bill granting powers to run motor omnibuses was made by the London General Omnibus Company and the London Underground Railway Company. Lord Wemyss presided over the Select Committee of the House of Lords, who afterwards considered the Bill. Mr. G. H. Hume, in giving evidence in support of the Bill, pointed out the great need for supplementing the tramway service by a service of omnibuses as tramway extensions through the central London area could not be obtained. He pointed out that the routes on which it was proposed to run omnibuses would be subject to the sanction of the Minister of Transport. In cross-examination, Mr. Hume stated that the Council only sought the new powers in order to complete its present system, and did not desire to compete with the omnibus company outside that system. He said the Council had not asked the omnibus company to provide services between the tramway terminals for two reasons—(1) They had control over their own system and it would be a most inefficient arrangement if they should not be able to round off that system without asking some outside undertaking to do it; (2) to ask them to do anything of the kind would be simply asking them to come to their assistance at a loss to themselves. He would like to see a co-operative arrangement between the Council and the private undertakings. All parties on the Council agreed that negotiations should be entered into with the Combine, and they were hopeful that it would be possible to effect an agreement for working. Detailed evidence was given by the General Manager of the tramways, Mr. A. L. C. Fell, as to the inadequacy of the London General Omnibus Company's service to carry forward passengers discharged at the tramway termini. Mr. A. Baker, general manager of the Birmingham Corporation tramways, gave particulars of the working of the omnibus powers obtained by Birmingham in 1914, and said that they had been of enormous advantage to the people of Birmingham. Mr. Frank Pick, commercial manager of the Underground group, stated in evidence that the company had 640 omnibuses (out of a total of 2,470) working daily in the London area affected by the Bill, and the area contained 59 stations of the Underground Railways. The omnibus service between the tramway termini would add greatly to the congestion at those places, and the difficulties of traffic in the central area should be met by new underground railways rather than by additional surface transit. In the view of the omnibus company an omnibus route should be at least five or six miles long, and the short routes contemplated by the Council would be below that average. They had had several conferences with the County Council. These had hitherto led to no practical result but they had then reached a stage which seemed quite hopeful. The Underground group had a continuous policy. Every one of their chairmen had been anxious for the co-ordination of London traffic. In speaking for his company, he could say that if the need for extra omnibuses were shown, they would be prepared to help the County Council by supplying them. They would start a service from the tramway dead ends if it were found necessary. If the short service was the proper solution, they would be prepared to give that short service.

The Committee finally decided that they could not approve of the clause in the Bill that dealt with the running of omnibuses by the Council. They wished it to be recorded that during the hearing of the inquiry the Council and officials of what is called the Combine had repeatedly expressed their desire to promote co-ordination of the traffic of London. It might, therefore, be hoped that pending the establishment of a Central Traffic Authority for London, the Combine and the London County Council would co-operate and that as far as circumstances and conditions permitted, the Combine would help the tramways by trying to provide increased omnibus services to meet the requirements of the tramways.

Higher Fares Application Refused.—The application of the South Staffordshire, the Dudley and Stourbridge, the Birmingham and Midland and the Wolverhampton and District Tramways Companies for permission to raise fares has been refused. The application was heard by the Committee of the Ministry of Transport at the end of last year, and was strongly opposed by numerous local authorities, including Tipton, Dudley, Stourbridge and Wednesbury.

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THE TRAMWAY WAGES INQUIRY

PROCEEDINGS BEFORE THE COURT OF INQUIRY APPOINTED BY THE MINISTER OF LABOUR.

The past month has been notable in the history of the tramway industry for the holding, at the direction of the Ministry of Labour, of a public inquiry into a dispute which has arisen between 63,000 British tramwaymen and their employers. The inquiry opened on January 26 at St. Ermin's Hotel, Westminster, and the Court sat on the two following days and also on February 2, 3, and 4, when the further hearing was adjourned until February 15.

Through their trade unions the tramway employees asked last October for an increase of 12s. a week for men and 6s. a week for youths under 18. As no agreement could be reached on the Joint Industrial Council, where the claim was first considered, the Ministry of Labour appointed a Court of Inquiry consisting of the following—

Sir David Harrel, G.C.B. (chairman),
Mr. Harry Gosling (president of the National Transport Workers' Federation),
Mr. G. H. Hume (late chairman of the Highways Committee of the London County Council),
Mr. W. F. Purdy (ex-chairman of the Labour Party), and
Sir Herbert Rowell (vice-president of the Federation of British Industries), Mr. H. C. Emmerson, secretary.

The following were the terms of reference—

To inquire into the causes and circumstances of the dispute between the employers' representatives and the workpeople's representatives on the National Joint Industrial Council of the Tramway Industry, and to report thereon to the Minister of Labour.

The Municipal Tramways Association was represented by Mr. J. B. Hamilton (Leeds), Mr. J. M. McElroy (Manchester), Mr. A. R. Fearnley (Sheffield), and Mr. A. L. C. Fell (London).

Mr. C. G. Tegetmeier and Mr. C. J. Spencer appeared for the Tramways and Light Railways Association.

Mr. Ernest Bevin and Mr. J. Cliff appeared for the National Transport Workers' Association, the United Vehicle Workers' Union, and other trade union organisations.

Capt. F. MacS. Gillmore was also present, and said he represented the travelling public and the Middle Classes Union.

WEDNESDAY, JANUARY 26.

At the opening of the inquiry the Chairman said the court had no powers of decision, but sat in an advisory capacity only to the Ministry of Labour, to whom they would report after hearing the statements of the parties.*

Mr. J. B. Hamilton explained that Exeter, Gloucester, Lancaster, Southend-on-Sea, Sunderland, and York had expressly stated they did not wish to be included in the inquiry. In addition, the Corporation of Liverpool was not a party, and had never been a member of the National Industrial Council.

CASE FOR THE EMPLOYEES.

Mr. Ernest Bevin then opened the case for the employees. He complained of lack of co-operation on the part of the employers' representatives on Whitley Councils, which in effect, he said, was wrecking the whole principle of Whitleyism. When a problem was put up that the employers could not answer, or could not argue against with reason, it was apparent that they were sent there as mere automata to express something they had been told prior to the meeting. "As proof of what I have said," went on Mr. Bevin, "I want to call your attention to what happened at the first meeting of the Whitley Council in this matter. Instead of taking this claim and examining it, or hearing our case, or hearing a single argument from a workmen's representative in support of it, the companies held a meeting on the Friday previous. They did not come to the meeting and say, 'Your standard of life is such that you are not entitled to an increase,' they simply said, in effect, 'Though members of the Council we will not discuss your application.'"

The unions concerned had made every possible effort by coming in a courteous spirit in their attempt to get a fair discussion. They pressed for arbitration. They did not want a strike, but the employers would not agree to arbitration.

The application was based on the increased cost of living, and Mr. Bevin, alluding to the recent fall in the official figures, pointed out that the nearer a family gets to the poverty line, the larger is its expenditure on bread. Tramwaymen were particularly affected by the removal of the bread subsidy, because they worked on a spread-over system, and had to carry their food with them in many cases.

"I know nothing," said Mr. Bevin, "that has been such a blow to the standard of life of the workpeople as the removal of this subsidy. It was a bitter tax on their wages, and added as much as 6s. or 7s. to their weekly budget."

At the dockers' inquiry, he said, held when the cost of living figure was 130, whereas now it was 165, a witness for the Port Authorities calculated that the minimum living wage in London was £3 17s. 6d., and in the provinces £3 13s. 7d., and the subsequent report mentioned that this witness had not made adequate allowances under certain heads. The average wage of a tramwayman when working for a municipality was £3 15s. 3d., and for a company £3 11s. 5d.

Mr. Bevin dealt with the commercial returns of the tramways undertakings in relation to the payment of a living wage. This point would arise throughout the whole of the case, he said. The commercial value of the industry must be tested by many standards, and first from a social point of view. The profit on a roadway could not be shown in a balance-sheet, but would anyone say that a roadway was not necessary because of that? From an industrial and social point of view tramways had become as much a necessity in our great and growing populous districts and the linking up of those districts as a roadway or any other public institution.

He criticised municipal authorities for contributing large sums out of tramway revenue to the relief of rates during the period of the war when these undertakings were prospering, instead of setting aside money for reserve and renewal for the lean period that was bound to come. He quoted figures of allocations to rates, and characterised this as very bad municipal finance.

Continuing, Mr. Bevin said he understood that the development of tramways depended, to a very large extent, upon the imposition placed upon them by the Act of 1870, when the main means of locomotion in this country were horse trams. He thought the court would agree that if Parliament had failed in its duty to amend the Act, or to bring the laws up to date with modern requirements, that could not be argued as a ground why the wages of the men should be below the proper standard. Obviously the remedy was an amendment of the law, and not to find a refuge in the refusal to pay proper and adequate wages.

Dealing with "spread-over" or "split" turns of duty, Mr. Bevin said the breaking up of the men's time in this way, and the consequent diminution of home life, should be compensated for by an increased rate of pay.

THURSDAY, JANUARY 27.

In resuming his speech on the following day, Mr. Bevin said that high physical standards were demanded from tramwaymen. Nerve strain was increasing, and was bound to increase. The high standard of efficiency demanded must be accompanied by a high standard of living. He enforced this point by quoting from a recent article in the THE TRAMWAY AND RAILWAY WORLD, demonstrating the care with which tramway men are selected.

Mr. Bevin went on to compare food prices to-day with those existing in pre-war days, and submitted to the court a number of family budgets from the homes of tramwaymen to prove that their incomes were inadequate. Mr. Bevin declared in conclusion that there was no question of compromise. The 12s. was put forward as a just and proper figure. If the court said that the industry could not bear it, or would not bear it, and they would not order it, then the question of control of industry would loom in clarified terms, and the workers would have to find some other solution.

Evidence was then called, and the first witness was Mr. Stanley Hirst, general secretary of the United Vehicle Workers' Union. From 1914 to 1918, he said, there was no readiness on the part of the employers to give wage advances commensurate with the cost of living. Drivers often suffered acutely from complaints such as rheumatism and asthma through exposure. His union advocated covering for the drivers, but their suggestions, with one exception, had not been adopted generally. Many had to give up driving after ten or fifteen years. He believed the London County Council recently had so many applications from drivers for a change of employment that they were forced to turn them down.

* A full explanation of the Position of Courts of Inquiry was given in THE TRAMWAY AND RAILWAY WORLD of January 13, 1921.

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In reply to Mr. McElroy, Mr. Hirst thought a few of the men might have been against the introduction of vestibules for drivers but certainly not the majority. He admitted that in the past a number of undertakings had been making losses. The increases in some cases might have to come from the passengers, but an undertaking ought not to be run unless it was prepared to pay decent wages.

Witness also stated that it would be impossible to run the tramways if rules were strictly adhered to. Drivers had to ignore regulations to make up speed.

Mr. E. H. Bawden, London district secretary of the United Vehicle Workers, gave evidence regarding the spread-over system. In London, he said, where a spread-over exceeded twelve hours, the men received a quarter-hour extra payment, and when it exceeded 14 hours they were paid an extra hour's rate. This only applied to companies, and not to the London County Council or other concerns. The wage paid by the companies was, roughly, £4 2s. per week.

In reply to Mr. Spencer (for the companies), witness said he was prepared to accept the contention that extra pay for Sunday duty brought the average weekly pay to £4 4s.

Mr. Spencer also put questions to witness to show that the men received uniforms, which he placed as worth 3s. per week. These men got holidays, with pay, worth 2s. per wek. They got free travelling, and this he estimated as worth 1s. 6d. per week. Taking all these items, he said, the wages were equivalent to £4 11s. 6d. per week, or 22·7 per hour.

The London district rate for a skilled fitter, commented Mr. Spencer, was 23·1d. per hour, and a 12s. increase would bring it to 25·7d. per hour.

Mr. Harold Clay, Leeds organiser for the United Vehicle Workers Union, gave evidence on the spread-over and split-turn system. A man would work for, say, four hours; then he might be off for five, six, or seven hours, and would go on for another four hours. The bulk of this type of spread-over duty would run from 10¾ to 13 hours.

This witness also gave his view of the effect in Leeds of taking £137,000 for the relief of the rates. The money had accumulated from the tramways during the war, and should have been available for renewals. Had it been so used there would have been no loss on the tramways. By using the money for the relief of the rates the latter were reduced. They should, on the estimates, have been 20s. 1½d. in the £, but were kept down to 16s. 8d. To the working man that meant a saving of about 10s. a year, but the increased tramways fares afterwards imposed meant an additional burden on the working man of 2s. per week.

FRIDAY, JANUARY 28.

Mr. Clay was cross-examined by Mr. J. B. Hamilton. Witness said the men contended that they should be paid from the time of booking on to the time of booking off. If cars were booked on and off at proper times, should not human beings have at least equal treatment? Waste time up to two-and-a-half hours should be paid for.

Mr. Hamilton said, in submitting figures to the court to show the exact position of undertakings to-day, no account would be taken of arrears. Present costs only would be calculated.

Mr. Spencer said it was untrue to suggest that tramway management did not pay regard to the humanities. It really came to this, that they did the best they could under the circumstances, and they tried as far as possible to improve the lot of tramwaymen.

Mr. Clay.—As far as you think.

Mr. Spencer.—You want to go a little faster than we can because you have not got the responsibility of finance.

Mr. Clay.—No, but we have the responsibility of the human factor.

Mr. Spencer asked to be allowed to correct the impression created on Thursday in regard to spread-overs in London. The arrangement for pay, he said, was as follows—Where the spread-over exceeds 12 hours, one half hour's extra pay at ordinary rates; where it exceeds 13 hours and does not exceed 14 hours, one hour's extra pay at ordinary rates.

Mr. Bevin also asked that a statement on Thursday should be amended. This was that instead of 2s. 6d. being the weekly average for Sunday duty, it should be 1s. 8½d.

Mr. Spencer.—And I now find that they work five Sundays out of seven, and not alternate Sundays.

Mrs. Seed, wife of a Bolton tramwayman, gave evidence as to wages averaging £3 13s. 9d. weekly. She presented her family budget to show the wage was insufficient properly to maintain her family of seven.

Cross-examined by Mr. McElroy, witness was asked if her husband had refused to work on Christmas Day?

Witness.—He had to come out with the others.

Mr. McElroy.—Do you know what he would have earned if he had worked?

Mr. Gosling took exception to the suggestion that witness's husband should have blacklegged.

Mr. McElroy said he was only asking for the facts.

A number of similar witnesses were called, and Mr. Hamilton said in view of the ruling of the court that cross-examination must be confined to the actual budgets, it was not intended to cross-examine such witnesses.

Mr. Bevin.—Your courage fails you when you come to tackle living conditions.

Mr. Gosling.—I can say after my experience with Civil Service cases these budgets are typical. Would it be possible to get the gentleman who prepares the Board of Trade figures?

Mr. McElroy.—We accept the Board of Trade figures on cost of living.

Mr. Bevin.—I have challenged the Board of Trade figures at my own committee on the substantial grounds that I could not get my people at home to accept them.

Mr. Gosling.—You will find that the Board of Trade official who prepares the figures cannot buy at these prices. He has already given that evidence before me.

Mr. John Cliff, secretary for the employees' side of the Joint Industrial Council, who is also an official of the men's union, gave evidence relating to the negotiations leading up to the inquiry and to previous wage increases. When the last 6s. increase was accepted, he said, the position was that wages had increased by 124 per cent. and the cost of living figure stood at 130 points above pre-war rates. Since then wages had depreciated in value. "In London," witness continued, "approximately between 10,000 and 11,000 men, who on the maximum rates of pay—39s.—in 1914 have suffered a depreciation to the extent that they received increases equivalent to 114 per cent. when the cost of living figure was 130. In their case the cost of living to-day is 169 per cent., and the increase in wages is only 110 per cent. To maintain the pre-war standard would require a wage of £5 4s. 11d. per week, the deficiency in the August, 1914, standard being 22s. 11d."

Mr. Hamilton, cross-examining witness, drew attention to the statement in the report of the Joint Industrial Council that if the demands were granted it would involve a further wages charge of £1,481,100. The actual loss on the industry, he said, was £3,310,000. "Now, Mr. Cliff, you had access to the figures. Can you inform the court as to the accuracy of the figures?"

Witness.—I had access to them.

Are they correct or incorrect?—The returns are correct. There is provision for renewals based on an estimate of 2d. per car-mile, which is not taken from the returns.

Mr. Bevin.—Witness has no means of forming an estimate. It is your estimate, and I would rather cross-examine your witnesses.

Mr. Hamilton proceeded to quote from the report—"This is a condition of affairs which no industry can survive." He would like very much to go into them, and suggested that the court postpone the adjournment for cross-examination of the witnesses on these questions.

This course was agreed to.

WEDNESDAY, FEBRUARY 2.

Mr. Henry Hermon Gordon, M.Inst.C.E., a member of the London County Council since 1904, was the first witness on this day. He said he had studied the tramway question, and specialised in urban transport problems not only in this country but abroad. The rating system as applied to the tramways in his experience operated most unfairly. This resulted from a purely local interpretation of an Act of Parliament passed in the days of Queen Elizabeth which had been applied to tramway tracks, and involved a considerable burden on all tramway undertakings. In London this was estimated at £150,000 per year. This was an unfair levy upon the tramways as compared with other forms of passenger-carrying road transport. How it worked was seen at Sheffield, where for every £22 paid by the tramways, motor omnibuses only paid £3 or £4.

Mr. Bevin.—And in calculating the commercial value you think we are entitled to have that on the credit side of our balance sheet?—Yes.

The net result is that the public who own the service get a contribution out of the service which is not taken out of private industry on the road.—Yes.

Witness also submitted that it was unfair to charge tramways with the cost of many street improvements which were not strictly limited to the undertakings. If other forms of traction were used the wear and tear on the highways would be much higher, and in the case of London would amount to £200,000 per annum.

Asked by Mr. Bevin if he were satisfied that there was a great future for the development of tramway traction, Mr. Gordon replied that he was. They were, in fact, only at the beginning of their development. If more facilities were provided there would be a greater development. It was an interesting fact that the increase in tramway traffic in five years totalled the railway traffic in England and Wales for the year 1914. If the tramways were properly managed there was a great prosperity for them. The present position of street traffic in London the witness described as "chaotic

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and disgraceful to the point of ludicrousness" The tramway system was hampered and restricted by its "dead ends," which in itself involved the employment of far more cars than otherwise would be required and led to the congestion of traffic, besides resulting in the wasteful expenditure of £200,000 a year, simply for time lost at the "dead ends" owing to delay in turning the cars.

Mr. Gordon said that the tramways suffered from "the chaotic conditions of London traffic, which led to so much duplication." A good deal of the opposition to the tramways in the streets came from a vested interest, and not from an opposition in the interests of the public. For instance, they would find that at Clapham Road where there was opposition 72,000 seats were provided for 29,000 passengers. He thought that competition had tended to restrict development, and said that opposition in Parliament to tramway Bills mainly came from vested interests, and was not taken in the public interest.

Mr. Bevin.—Do you think increasing fares is the only method open for increasing revenue?

Witness.—Mere increase in fares to meet increased expenditure is one of the very worst forms of securing that result. There is an interesting case in London to-day where an authority determined at the same time both to increase fares in one direction and to reduce them in another. Increase in fares added something less than 20 per cent. to revenue, while the increased revenue due to the extension of facilities exceeded 30 per cent. He added that he thought the removal of the present unfair charges on tramways would enable the tramways to pay fair wages.

In cross-examination by Mr. J. B. Hamilton, witness said he did not speak of ideal conditions, but what was practical and could be justified.

In reply to a question as to whether a tramways undertaking should be self-supporting, witness said that he could not agree if the tramways had to provide unheard of facilities that no commercial undertaking would provide. By unheard of facilities he meant, for instance, getting tramways to assist in the development of housing estates which were in the interests of public health.

Answering Mr. C. J. Spencer, witness said, in regard to the increase of fares, that he felt a "slap-dash" effort had been made simply to meet increased working expenses by increasing the charges to the public.

At this point Mr. J. Cliff re-entered the witness-box to allow Mr. Hamilton to continue his cross-examination.

Mr. Hamilton asked witness if it were clear that the index figure regarding cost of living had been the dominating factor in increasing wages.

Witness did not altogether agree that that was so. He agreed that the wage settlements from 1914 to March, 1918, had been by agreement between the undertakings of the representatives of the union. From March, 1918, to March, 1920, they had been by awards of the Joint Industrial Council.

Questioned by Mr. Spencer about the effect of the last award and how it was received by the men, Mr. Cliff said that if the man in the front of the car knew all he (witness) knew of the Council proceedings he would not be as patient as he was. With regard to the attitude of the companies, witness said he could not understand men who professed adhesion to the principle of "Whitleyism" refusing to consider the merits of the case.

Mr. James H. Palin, Bradford organiser of the United Vehicle Workers' Union, and for 16 years until recently a member of the Bradford Corporation, gave evidence emphasising how tramways could be developed by linking up cities and urban areas. Tramways could be used extensively for parcels traffic. His friend Mr. McElroy would be quite capable of linking up tramways within twenty miles of Manchester.

Mr. Bevin.—And quite capable of paying 12s. a week?—Witness—Yes.

CASE FOR THE EMPLOYERS.

The case for the employers was opened by Mr. J. H. Beckett, general secretary of the Municipal Tramways Association, giving evidence.

Mr. Beckett stated that in regard to the demand for 12s., the Association, in view of the financial loss, could not accede to the wages claim. The question of arbitration was out-voted by 41 to 39. In regard to Mr. Bevin's suggestion that the voting should be according to the number of employees, if that applied all the non-county boroughs in Lancashire and a few county boroughs thrown in could be out-voted by Manchester. Manchester could, in another instance, out-vote twelve county boroughs. In their Association they found that each member should have one vote, and that was the only workable basis.

In reply to Mr. Gosling (a member of the court), witness said that on the arbitration vote the 39 represented more in point of numbers than the 41.

Mr. McElroy, on the subject of the cost of living, asked—In October, 1919, the cost of living was 120s.; the bonus awarded by the court was 34s. Assuming that they were quite right, what ought to be the figure when the cost of living is 165?

Witness.—46s. 9d.

What do they get?—43s.

The difference is 3s. 9d., so if the cost of living is going down that will shortly disappear?

Witness.—That is so.

Mr. Beckett said that he had a letter from an official of the Government. The letter was a long one, and stated that it was "fairly certain the index figure for February 1 will be lower than January 1."

Mr. Bevin.—At this stage I desire to make application that the gentleman responsible for these figures, and who has written these letters on those figures, should be put into the box here and representation made to the Ministry of Labour that he should be brought here.

The Chairman undertook that Mr. Bevin's application should be forwarded to the Ministry of Labour.

THURSDAY, FEBRUARY 3.

Mr. Beckett continued his evidence. He stated that the 39 municipal undertakings which voted for arbitration represented 29,344 employees, and the 45 undertakings that voted against represented 15,141. As to the question of clothing, the average arrived at in the White Paper (a report drawn up in November by Messrs. Beckett and Cliff) was derived from the costs of uniform clothing, which in 1919 varied from £4 6s. 8d., the lowest figure, up to £14. For the same number of articles represented in £4 6s. 8d., the price in 1914 was £2 0s. 6d. It was more than double.

In regard to Mr. Gosling's request for the figures of the wages in 1905 and the comparison with present wages and the increased cost of living, Mr. McElroy said the employers had carefully considered that question, and so far as they were concerned they submitted with great respect that they did not propose to put it in. When the joint report was prepared between the two secretaries they confined themselves, in their view very properly, to a comparison as to the increase in the cost of living from the year 1915. The present was an application on the increased cost of living, and it was clearly in the minds of both parties at the time that the circumstances arose out of the war. The figures were in court showing the increase in the cost of living during that period. They had compared the increased cost of living since the last public examination by a Court of Inquiry—and a very exhaustive one for the whole country—up to date, and they had also put in the wages that had been given in compensation. They proposed to let it rest at that. If the court wanted to go into the question of living since 1905 the court could no doubt get the figures from the proper authorities.

Mr. Gosling.—You mean by that that if the witness is asked the question you will tell him not to answer?—Yes.

Mr. Gosling.—I shall ask that from each witness.

Mr. Hamilton thought if the court desired any special information they could get it, but he did not think they ought to interfere with the general line of evidence they had adopted. He thought a little consideration should be shown to the continuity of the evidence they were submitting.

The Chairman.—A question has been asked in regard to the cost of living in 1905 and the present day.

Mr. Gosling.—The wages paid in 1905 and now, and what is the increased cost of living. That is what I should like to know, Mr. Hamilton. I am here as an independent member of the court, and I am not going to be told how I shall conduct myself.

Mr. Hamilton was sorry Mr. Gosling took it in that way. Mr. Gosling asked for information not in line with the general line of evidence they were submitting, and he thought they should be allowed to conduct their own case.

Mr. Gosling.—The witness is entitled to answer a question of that kind, and you are not entitled to tell him not to.

Mr. Beckett then dealt with figures comparing the wages of labourers and skilled men in other industries. The tramway industry had experienced a slump in trade for some weeks back. He had taken the last sixteen weeks of 1919 and the corresponding period of 1920. During the first four weeks of that last sixteen weeks in 1919 they carried 226,755,106 passengers, but in the last four weeks that fell to 213,116,288, a loss of 13,638,818. That was for 66 authorities.

Mr. Purdy (member of the court).—Why have you chosen the last sixteen weeks of 1919?

Mr. McElroy.—Because the last sixteen weeks of 1920 represented the slump in trade, and we chose the corresponding period of 1919.

Witness continued that for the first four weeks of the 1920 period they carried 225 millions, and in the last four weeks it fell to 203,963,374. They had driven off the cars eight million passengers more than fell off during the corresponding period of 1919. It was quite clear that during the slump in trade there had been a great decrease, and it had been accentuated during the current year. Witness continued to deal with the question of comparing wages with other industries. He contended that they could not

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compare a tramwayman with a skilled mechanic. The latter had to serve an apprenticeship, and the former, in a number of cases, was originally a labourer, and during the war was trained in a month. There was no comparison between a man who was a skilled engineer, and served an apprenticeship, with a man who had not.

Mr. Gosling.—Suppose the same standard of skill prevails, and is quite equal, does it matter how he reached that standard ?

Witness.—Yes, I think it does. You have the same thing in your London county schools. You have certificated and uncertificated teachers, graded according to their attainments and doing similar work.

Sir H. Rowell.—Is not your point that consideration should not altogether be lost of what the earnings of a tramwayman would be if the tramways closed ?

Mr. Gosling.—But before you lift a man from a labourer you have paid some attention to his ability, and he is selected because of his ability. In other words, he is fit for a better job. Your contention seems to be that because a man was originally a labourer and ran higher it should always be borne in mind that he was originally a labourer.—Mr. Bevin was a farm labourer's son, and was that always to be considered in fixing his salary for whatever work he performed ?

Continuing, Mr. Beckett said that in the financial year ending March, 1920, eighty municipal tramway undertakings had a surplus of only £775,000 without making any provision for the wastage of assets during the year. If the figure of 2½d. per car-mile was taken as the correct one for renewals, though in his opinion it was too small, they would find that the tramway industry was carried on at a loss of £1,500,000 during the year 1919-20. That deficit occurred notwithstanding the revenue earned from largely overcrowded cars. Investigation of recent accounts made it appear that the annual loss now approximately amounted to £3,310,753, assuming that the car mileage run was the same as that for 1919-20. Taking the industry as a whole, the actual revenue at present fell short of the approximate expenditure by 3·55d. for every car-mile run. In other words, the deficiency was 3s. 2½d. for every £1 of traffic receipts ; but if the amount of the increase in wages now asked for was added to the present approximate expenditure, the corresponding figures would be 5·14d. per car-mile and 4s. 8d. for every £1 of traffic receipts. This was a condition of affairs under which no industry could survive. The actual cost of the 12s. advance would be £1,481,000, added to the loss of over £3,000,000 annually.

In regard to payments in relief of rates, there were three cases only, Manchester, Sheffield, and Leeds. Witness handed in a schedule showing the charge on the rates caused by a number of tramway undertakings. He also put in figures of unemployment, so as to show how they meant decreasing tramway revenue.

Upon the question of paying for street and road improvements, which Mr. Bevin argued was added to the tramway capital, witness said that the Board of Trade figures showed that municipalities expended on tramways in the shape of capital outlay £47,742,223. That expenditure was divided under different headings, and under the heading of "street and road improvement, including the purchase of land," was the sum £2,327,061, or 4·8 per cent. of the total. If they analysed that amount they found that the amount was confined almost to the Metropolitan undertakings. Of that sum, one and a half millions, or 65 per cent. of the whole amount spent in England and Wales, was spent in London. If the tramways were relieved of this charge to suit Mr. Bevin, the total relief would only be £120,000, which would be one-twelfth part of the amount needed to meet the present claim.

In many cases the tramways had reached the limit of their earning capacity, and sections of the industrial population were ceasing to use the cars. In considering these claims they had to consider the general body of ratepayers as well as the employees, and decide whether they should tax the ratepayers in order to pay increased wages.

Cross-examined by Mr. Bevin on the question of earnings, Mr. Beckett said he was the last man to speak disparagingly of the social disadvantages under which the tramwaymen worked, but when a man went for a certain job where these social disabilities and disadvantages obtained he entered the job with his eyes open. The 48-hour week cost the tramways 3s. in the £1 on the total wages bill. It varied in certain districts. Following that reform the earnings had been relatively colossal, but if they had not been colossal the undertaking would not have been moribund but would have been bankrupt. They were always driven back to what wages were paid in the neighbourhood where the cars were running, and that must be the final test for wages. It had been laid down that the industry must be self-supporting. There had been cases where the cars had been perpetually subsidised out of the rates. The dominant question at the moment was that the working classes who rode in the cars could not pay more. After all, that was the point. The tramways was the one industry in which the country objected most to increasing fares. The tramwaymen did not enjoy any increased prosperity during the war ; and if fares had been raised they could have got more money during that period.

FRIDAY, FEBRUARY 4.

The Chairman said that the court called for a return showing—(1) Route mileage, (2) number of persons employed from 1914 to 1920, (3) excess of expenditure over revenue in respect of each undertaking, and source from which excess was met from 1914 to 1920 ; (4) excess of revenue over expenditure, and how the excess was disposed of ; (5) amounts granted by each undertaking on the base rates subject to the Industrial Council agreement of March 31, 1920 ; (6) variations between wage rates 1905-1914, if any, for each undertaking. The chairman suggested that this return would tend to shorten the inquiry, and he mentioned it at that juncture in order to give time for it to be prepared. They must all do their best. All felt, while they desired to give the utmost latitude in carrying out that inquiry, they were all interested in not unduly prolonging the proceedings. It would not do not to have the return at their disposal before the court rose.

It was arranged that the court should send the schedule with a covering letter to the various undertakings.

Mr. Hamilton then said that he proposed to call members of Corporations and tramway managers to deal with the working and policy.

Alderman R. A. Smithson, chairman of the Leeds Tramways Committee, was the next witness. Mr. Smithson stated that he had been chairman of the Leeds Tramways Committee since 1898, with the exception of two or three years. He dealt with the history of the undertaking at considerable length, particularly with reference to the relations with the workpeople and the financial policy which had been pursued by the committee. They preferred low fares and higher rates, because the rate might be only 10s. or 12s. a year, but a shilling a week on fares meant 52s. a year. The workmen at Leeds had exceedingly low fares. His experience was that the workmen's fares involved a loss in Leeds of £80,000 or £90,000 a year.

Mr. Smithson said on general policy the Council had considered the ratepayers, being security for the capital money spent, should have the benefit of the surplus, whatever it might be. It had averaged for 27 years just over £50,000 per annum, which was rather less than 5 per cent. on the money raised on the security of the ratepayers. With the exception of the Labour Party, the Council and all parties and the city had agreed that that was a sound business proposal. In 1918-19 the net deficit on the Leeds undertaking was £30,495. They had now reached their maximum charging powers. During the war they carried out some renewals, but not the nine miles a year which was regarded as the average to be aimed at. They had not attempted to tackle the arrears of renewals, as there was still a difficulty in getting materials. No progress had been made in making up permanent way renewals.

In cross-examination, Mr. Smithson said the cost of the wage advance of 12s. per week would mean £65,000 to Leeds. The Leeds ratepayers had benefited to the extent of £1,376,776 since 1895.

Mr. Bevin.—Was it sound finance to vote £137,000 away which had been accumulated during the war, having regard to the circumstances ?—We had to take the situation as it arose at the moment.

Assume it was a private concern, and you were chairman of directors, and you had accumulated a reserve fund of this amount to meet a contingency created by war conditions, would you have told the shareholders it would be wise to give it away ?—Private concerns have provided their reserve funds.

If somebody had come along and said, "We are entitled to that contingency fund, and you have no right to have it, it is my money."—I could not do anything else.

Supposing the fact were put before the Leeds citizens that it would hamper the renewal and reconstruction of the industry due to war conditions, would there then have been pressure from the Leeds citizens ?—It was put before them by the Labour Party what the effect would be, and I don't agree that it has hampered renewals seriously.

If Leeds was justified in voting this £137,000, and can still go on with renewals and contracts, and we say the men's wages should be brought up to the pre-war standard of purchasing power, is there any justification on the same basis for withholding a proper wage ?—We consider we pay a proper wage.

Assuming the court shows that the wage is inadequate, do you think the Leeds tramways could pay a proper wage ?—We say it is doing so to-day.

Mr. S. Flint, for 20 years chairman of the Leicester Tramways Committee, said that for the year 1920 the loss on Leicester tramways was estimated at £10,000. They renewed the track out of revenue, and they had a reserve fund for extraordinary renewals of £100,000. For five years they had not given anything in aid of the rates, and in all they had given only £34,000. An increase of wages of 12s. a week would cost about £30,000 to Leicester. They raised the fares last year, and in consequence lost over 5,000,000 passengers. At present they were losing at a much greater rate.

To allow of the return asked for being prepared, the court adjourned till February 15.

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GLASGOW AND THE HALFPENNY FARE.

A proposal to revert to the halfpenny fare on Glasgow tramways but to make such fare cover only one half-mile stage was recently brought before Glasgow Corporation, but consideration was adjourned till the end of the financial year. The suggestion, however, was productive of an interesting memorandum by Mr. James Dalrymple, the general manager, which was presented to the Council. In this he says that when the Corporation took over the tramways in 1894 they divided the system into stages of a little over half-a-mile each, and these have been maintained ever since. Till the end of 1911 one stage was given for a halfpenny, and after that two stages were given for that fare. On May 31 last a halfpenny was added to each fare, thus abolishing the halfpenny fare. The report then gives tables showing the decreases and increases in the number of passengers at various fares after the latter were raised. The figures are for the six months from June 1 to November 30 last year, with a comparison with the corresponding period of 1919. The totals show that while the number of passengers fell from 247,685,273 to 220,455,667, the receipts rose from £841,846 to £1,166,529. In the last year before the halfpenny fare was abolished 59·86 per cent. of the passengers paid that fare. As that fare covered two stages, the proposal to revive it, but for only one stage, could not produce such a large percentage of halfpenny passengers as 60.

From a series of calculations Mr. Dalrymple concludes that if the halfpenny fare for one stage had been in operation during the six months to November 30 last the revenue would have been reduced by £33,788, or at the rate of £65,576 per annum. The revenue derived from the halfpenny fare during six months of 1919 was £308,338, whereas the revenue for the six months of 1920 from the ¾d. (coupon) and 1d. fares, which cover the same distance, was practically £500,000. This figure is bound to be enormously reduced by the introduction of the halfpenny fare, and whether the shortage would be made up by the increase in the number of passengers it is very difficult to say.

There is no doubt that the undertaking is at present losing money through the inability of the conductors to overtake their work. What the conditions would be like were the half mile stage given for ½d. fare one does not care to contemplate. Why, asks Mr. Dalrymple, was this proposal made before the Corporation had placed before them the results of the six months' working to November 30 last? One reason given is that the change would yield a still larger revenue. It is difficult to say how this is possible when the cars are already crowded to excess with ¾d. and 1d. passengers. Another reason given is that the ½d. fare would enable shop girls and others to go home for dinner in cars that are now overcrowded with the same people holding ¾d. and 1d. tickets. The general experience all over the country is that when an increase of fares takes place the number of passengers carried drops from 10 to 15 per cent. Who are the passengers lost since 1st June, 1920? They are those who used the cars for very short distances, and at the "rush" hours kept out those who wished to take a longer ride.

The shop girl is still riding home for her dinner with the ¾d. coupon, and although it is now costing her an extra 2½d. per week, she finds that it pays her handsomely to use the car even at this increased charge. Surely the passenger who has only half a mile to ride should pay his or her share of the enormous increase in the working expenses. This proposal means that he or she is to get off scot-free, and that the whole burden of the increased cost is to be thrown on the unfortunate passenger who has to pay the higher fare, and who is also a citizen of Glasgow.

To show the present financial position of the department, Mr. Dalrymple proceeds to give figures for the five months ended October 31 last. These show a revenue of £973,601, and working expenses of £754,675. Out of the balance of £218,926 come income-tax, depreciation and renewals, proportion of last year's deficit, increase of wages (arrears), and some smaller items, leaving a surplus for the five months of £7,407. He goes on to say that these figures make no provision for any return on the £4,000,000 of capital invested in the undertaking. It is well to remember also that there is in front of the department a capital expenditure amounting to several millions sterling for extensions and improvements, and, as matters stand, not a penny can be borrowed for this purpose, as the department will be unable to meet the interest and sinking fund charges.

I think, he says in conclusion, it would be wise to allow the department to have at least one full year's working at the present fares before any change should be thought of. The result of the change which took place on June 1 has been exceptionally favourable. No tramway undertaking in the country has such low fares, or shows such elasticity as the Glasgow Corporation Tramways.

The Rule of the Footpath.—Of 35 county councils who responded to a request for their views as to the rule of the footpath, 23 were favourable to the proposed left-hand rule, 6 were against, and 6 expressed no opinion.

MANCHESTER TO LEEDS BY TRAMWAY CAR.

THE OBSTACLE OF DIFFERING GAUGES.

With reference to the suggestion by one of the witnesses at the Tramway Inquiry that the various tramway systems in the neighbourhoods of Manchester, Huddersfield, Halifax, Bradford, Leeds and other areas in the West Riding should be linked together in the interests of economy and to facilitate parcels traffic development, a writer in the *Manchester Guardian* points out that so far as the actual distance is concerned no serious difficulties stand in the way of such a linking up, as the existing tramways cover all the ground except for a few miles on the Lancashire and Yorkshire border. The lines of the Manchester Corporation connect at Middleton with those of a company which joins up to the system of the Rochdale Corporation, and the Rochdale lines extend north-eastwards beyond Littleborough to the little village of Summit. Then begins a break of three miles to Walsden, whence there is a motor-omnibus service through Todmorden to about a mile from Hebden Bridge, where the Halifax Corporation's tramcars start on a course connecting with the Bradford system, which, in turn, links up with that of the Leeds Corporation.

Thus there remains only about eight or nine miles of track to be laid down in order to complete an unbroken line to Manchester, and through Manchester, of course, to Liverpool. But tramway experts are exceedingly sceptical that the time has yet arrived for putting into operation a scheme like the one suggested at the inquiry. Excepting Todmorden itself, the country through which the connecting line would run is much too sparsely populated to enable either a passenger or a parcels service to pay.

The *Yorkshire Post*, in an article discussing the same subject, points out that one difficulty is the fact that while most of the larger Corporations run their own services, the undertakings in other towns belong to private companies. If Dewsbury were joined up with the Leeds system as Wakefield is, the Heavy Woollen District could be more readily tapped for both passenger and parcel traffic. But from the Dewsbury Road terminus to the boundaries of Dewsbury there is a stretch of several miles of country which would yield little revenue, while the laying down of the track, at present-day costs, would be enormous. This instance is typical of others in the West Riding area.

It is pointed out that, so far as the parcels-carrying service is concerned, great developments have taken place in recent years. The Leeds tramway authorities now undertake this service, not only in their own city but as far afield as Bradford, Wakefield, Halifax, and the Heavy Woollen District.

With regard to linking up with Manchester, the writer remarks that one of the obstacles of having a through service, either for passengers or goods, is that the tramway gauges on the Yorkshire side of the Pennines are not the same. Leeds has the broad gauge. Bradford the intermediate, and Halifax the narrow type. Before the war, Leeds cars ran into Bradford, and Bradford cars into Leeds by means of the adoption of a sliding axle. This through service had, however, to be suspended during the war on account of the difficulty of repairing the wear and tear of the axle machinery. Incidentally, we understand that the Leeds Corporation are willing to renew the agreement for a through service, but that Bradford has not expressed an equal readiness.

The varying tramway gauges between Leeds and Manchester would mean that at every terminus between the two cities parcels would have to be separately handled, and the expense of this would swallow up any profit earned. "Until parcels can go all the way in one vehicle," said Mr. J. B. Hamilton, the Leeds tramways manager, "the idea is out of the question."

HOW OPERATING COSTS HAVE RISEN.

The estimates of the Sunderland Tramways Committee contain an interesting comparison between 1914 operating costs and those estimated for 1921. The figures are appended—

	1914.	1921.
Wages of motormen and conductors	£13,795	£46,000
Uniforms and badges	633	3,500
Rates and taxes	2,697	11,800
Income Tax	637	8,150

The men work eight hours a day instead of ten, and the estimates do not provide for any calculation based on the present 12s. a week increase demand.

Brill Truck Parts.—Tramway managers interested in the new Brill stock of truck parts can obtain an enlarged reproduction of the Brill Company's advertisement in this issue, mounted on stiff board for reference purposes in the depot, on direct application to the company at 150, Southampton Row, London, W.C.2.

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LONDON UNDERGROUND GROUP.

NEW OMNIBUS AND RAILWAY REPAIR SHOPS.

There are now being erected on vacant land near Acton Town Station great overhaul and repair shops for the London General Omnibus Company, and close by still larger shops for the maintenance of the rolling stock of the railways for the Associated London underground electric railway companies will soon be commenced. The circumstances as to the land acquired are somewhat unusual. Situated on the south side of the Metropolitan District Railway, between Chiswick Park and Acton Town Stations, it extends to about 90 acres. For many years it has been under intensive cultivation as market gardens, and the enterprise has been so successful that it is said that three successive tenants have made fortunes out of it. Among the reasons why the associated companies acquired it rather than other and cheaper land, are, it is understood, that it is convenient of access both by railway and road, and that it is quite flat. The latter consideration is of considerable importance when buildings covering a large area of ground have to be erected.

The London General Omnibus Company have acquired about 26 acres of the ground for the purpose of erecting thereon a central overhaul shop, and the buildings are now advancing towards completion. As is well known, the Commissioner of Police requires that every omnibus working within the Metropolitan Police District must be overhauled and repainted annually. This work is now carried on by the omnibus company in a large number of garages distributed over the whole of the London area. It is the intention of the company to centralise this work in the new shops. A great deal of thought and expert opinion have been devoted to the scheme, and the shops will be of such a character and area that the whole of the fleet of the omnibus company will pass through them for the necessary heavy overhaul, repair, and re-painting on an annual basis.

Very considerable economies are anticipated as the result of centralisation, and at the same time it is expected that greater uniformity in the repairs carried out will be secured than can possibly be got when a large number of isolated garages are, as at present, carrying out the work. The shops are being laid out on a unit-part basis, so that the chassis will pass through the heavy overhaul in a manner similar to that obtaining in the works of the Associated Equipment Company, where the chassis are manufactured.

The remaining 64 acres, or thereby, of the ground, are to be used for the erection of central shops for the heavy overhaul of the coaches employed on the underground railways. These works will be more extensive than those of the omnibus company, and more elaborately equipped, as they will have much heavier units than omnibuses to deal with, and units with parts correspondingly heavier. The cost of construction and equipment will approach £250,000, but it is expected that the savings arising from centralisation of the work will more than counterbalance the large capital expenditure. At present the heavy overhaul of the carriages is being carried on in five different workshops—one for each of the railways, controlled by the Underground Railways Company, of London—but in future it will be carried on at the new shops, approximately on an annual basis. The evergrowing demands of London traffic, and the constantly increasing loads which the railway coaches have to bear, have thrown more and more work on the isolated workshops of each railway, so it is felt that economies can be effected by centralisation of the heavy overhaul, leaving to the existing shops of each railway the work of day-to-day repairs and replacements of worn out and defective parts.

The omnibus company's new shops will probably begin operation in July next, while the railway companies' establishment is expected to be completed in about 15 months' time.

A Six-wheeled Omnibus in Paris.—The *Times* Paris correspondent states that the authorities have been giving practical trials to a six-wheeled omnibus. The new omnibus has the advantage of being steadier than the ordinary omnibus now in use, and the further great advantage of being able to carry 10 more persons, a very important consideration in these days, when there are not nearly enough omnibuses to cope with the traffic during the rush hours. The only disadvantage of the new vehicle is that it is so large that it could not be employed on routes that would take it through narrow streets.

Leo Swain and Company, Limited, Deansgate, Manchester, have ceased to act as sole selling agents for the Slough Trading Company. Messrs. Swain and Company are still able to offer their customers from their own heavy stock great bargains in unused Government disposal tires.

THE QUESTION OF FREE PASSES.

NEWCASTLE AND SALFORD REJECT PROPOSALS.

Newcastle City Council discussed on January 13 the report presented by the Tramways Committee proposing that free tramway passes should be granted to members of the Council. Alderman R. Mayne, Chairman of the Committee, who was one of eight who voted against the proposal in committee, in moving the recommendation of the report, observed that he did not know of a single argument in favour of the proposition. "We have done," he added, "all we can to chop off privileges and still it may be necessary to increase fares."

Mr. Teago, who seconded the motion, asked why should they not have free passes. What was the difference of allowing this concession and allowing the expenses of members who had to go away on deputations. The chairman and vice-chairman had free passes, why should not all the members of the Council?

Alderman Mayne said that the passes held by the chairman and vice-chairman were voted to them, and the Council were at liberty to take them away when they liked.

Mr. H. A. Lawson said from enquiries made of 41 towns they learned that in five cases there were free passes granted to members of the Council, 14 cases where the chairman and the vice-chairman, and in some cases the mayor, had free passes, and there were 22 towns which did not grant passes.

The Town Clerk, in reply to a question as to the legality of the position, read a reply he gave in 1912 to a similar question, the effect of which was that it was not within the province of the Council to grant free passes, because it might be looked upon in the light of remuneration for services rendered, and it was probable that the granting of free passes might be considered by the auditor to be in the nature of remuneration.

Mr. J. Wilson (Labour) spoke against the proposal on the grounds of its tardiness and the fact that it did not foot the bill.

The voting resulted in 24 for the report and 30 against. Two members declined to vote. The report was therefore rejected.

Salford Council have rescinded a resolution to which they had agreed to issue passes to members of the Corporation, the Town Clerk advising that the proposal would be illegal.

Dundee Council have abolished Corporation officials' passes. Many members had previously returned the passes sent to them by the Town Clerk.

TRAFFIC AT CAR STOPS.

TOWNS SEEKING POWERS TO CONTROL IT.

Liverpool, Burnley, and Preston Corporations are seeking, in their Parliamentary Bills deposited for next seesion, to obtain powers similar to those already possessed by the Glasgow Corporation in regard to vehicular traffic at places where tramway cars discharge or take up passengers. It is proposed that vehicles passing on the near side shall be brought to a stop by their drivers. This demand has arisen in consequence of the inconsiderate action of some motor drivers in endangering people seeking to board or leave tramway cars.

Manchester Corporation had decided to obtain similar powers, but when the Bill, which included other projects came before a town's meeting it was thrown out. This result has been attributed to the manner in which the cartage interest had worked up an opposition. The Corporation decided to submit the proposal to a poll of the ratepayers, along with the scheme for extending the gas undertaking. So far as the voters took the trouble to poll, the result was overwhelming in favour of the Corporation seeking authority from Parliament to bring the proposed by-law into operation. In favour of the scheme 13,678 votes were recorded, while only 1,610 persons voted against it. There are nearly 300,000 names on the register of voters. Replying to a question at a recent meeting of Newcastle-on-Tyne Council, the Chairman of the Watch Committee said he would bring before that committee the question of requiring other vehicles to stop when a tramway car was taking up or setting down passengers. He was afraid that Parliament would not grant local powers; any legislation would have to be on general lines and applicable throughout the country.

CROWDING IN CARS AND OMNIBUSES.

A deputation from the Trades Union Congress, at the request of the Vehicle Workers' Unions, on February 10 asked the Minister of Transport to prevent overcrowding in omnibuses and tramway cars. Sir E. Geddes replied that he would make inquiries, with a view to bring about further improvement. Every undertaking was making an endeavour to increase the accommodation, but a difficulty to be faced was that very few concerns were being operated at a profit, notwithstanding the increased fares.

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FRENCH LIGHT RAILWAYS IN TROUBLE.

The vitality of the French light railways has been jeopardised by dear goods and high wages. Generally such railways have been exploited at the sole risk of the *concessionnaires*. The municipalities participated only in the construction of the lines to the extent of, say, 75 per cent, the *concessionnaire* contributing the balance and receiving annuities from the respective municipalities for the duration of the concession, the annual amount including interest and the amortisation of their part in the first cost of the concern.

From before the war, however, some lines failed to work normally under this system. Traffic at certain times failed to cover expenses; besides, the *concessionnaires* paid more attention to the construction than to the exploitation. The municipalities assuming the three-quarters of the first cost on condition that such did not exceed 60,000 francs per kilometre, or a little more in hilly country; they endeavoured to reserve as contractors a profit equal to about the fourth part. For this purpose they created limited companies to which they re-assigned the lines. When they had collected their quarter, they could become disinterested. So then, to keep the exploitation going, the municipalities were obliged to take back their light railways. Then generally they made these over to the Compagnie des Chemins de Fer Departmentaux, or to the Société Générale des Chemins de Fer Economiques, guaranteeing as a rule an interest of 4 per cent.

For the numerous lines that did not enjoy such a guarantee, the high prices have proved very injurious. Wages have risen in the proportion of 1 to 4 or 5. Most goods have appreciated in cost to an almost equal extent, if not more. Coal, particularly, that cost 20-30 francs per ton before the war has since cost them 300-400 francs, a difference quite serious enough to upset the budgets of these concerns which consume about 10 tons per kilometre per annum; whereas the gross receipts per kilometre per year amounted to about 5,000 francs.

As a rule the traffic has increased, but the increased receipts have been quite insufficient to cover the increased expenditure, and the increased rates authorised by the County Councils amounted to less than the increased cost, though in this respect the light railways have been more generously treated than the heavy lines; and the kilometric receipt of 5,000 francs per annum have exceeded 10,000 francs in most cases. But this barely sufficed even for the best of them. Therefore the companies have applied for relief from the consequences of growing costs, and a system adopted is one advocated for the heavy railways as applied in common in the Parisian district. The municipality or department takes all the risk, and the major share of the profits. One plan largely in use is to allow the *concessionnaire* a rate fixed at a fraction of 3 to 10 per cent. of the gross receipts to vary according to their importance, with, in some cases, a share in the profits; but bearing also a limited share of the losses, which generally are not sufficient to wipe out completely the allowance for exploitation. Further, interest at 4 per cent. is sometimes allowed on capital representing supplies.

At times the Councils Generaux have granted subsidies to the light railway concerns, the rates on which, being appreciably higher than on the heavy lines, capture a share of the traffic, and any further increase in their rate would seriously endanger their business. The changes made in the *cahiers des charges* of the local light railway concerns have considerably eased their position. High prices for coal, &c., prevent them from making big profits, and the concerns that were doing well before the war are now about on the same level as the others. But the adoption of an exploitation allowance (called wage), accompanied by an increase in the tariffs—and in certain cases by local council subsidies—whilst the risk of profit or loss on exploitation belongs for the most part to the Departments, appears calculated to assure the companies of a moderate return.

RAILLESS TROLLEY CARS.

Municipal tramway authorities hope to persuade the Minister of Transport to allow them to run railless trolley cars in connection with their tramway systems without being put to the expense of obtaining special Parliamentary powers.

Mr. J. Dalrymple, general manager of the Glasgow Corporation Tramways, has been asked by the Committee on Tramway Extensions to prepare a report on the advisability of running railless trolley cars over the routes for which tramway extensions have already been arranged. It is suggested that an experiment might be made on four routes.

Italian Tramcar Disaster.—It is reported that five persons were killed and forty-five others injured on Feb. 19, in a tramcar accident at Frascati, near Rome. The car was nearing the top of a steep incline when a part of brake mechanism broke and the vehicle got out of control.

FINANCIAL REPORTS AND MEETINGS.

DARLINGTON DEFICIENCY.—A loss on the tramways for the past year of £4,759 was reported at a meeting of Darlington Town Council.

STILL A LOSS ON L.C.C. TRAMWAYS.—It was reported to the London County Council on February 1 that the tramways accounts showed a deficiency of £440,000 for the past nine months. The probability is that at the end of the financial year another rate will have to be made to meet the loss. A rate of 2½d. is now being paid to meet the loss incurred in 1919-20.

METROPOLITAN RAILWAY DIVIDEND.—The Metropolitan Railway Company announces a dividend on the ordinary shares at the rate of 2 per cent. per annum, making 1½ per cent. for the year, and carrying forward £15,500. The dividend for the corresponding half of 1919 was at the rate of 1½ per cent. per annum, making 1½ per cent. for the year and carrying forward £19,864. A year ago the allocation to general renewals was doubled with a transfer of £40,000. This year £50,000 is allocated to the general renewals fund.

TYNESIDE TRAMWAYS AND TRAMROAD COMPANY.—The report for the year ended December 31, 1920, shows a profit of £3,340. The balance brought forward amounted to £1,010, and there is thus a credit of £4,350. After deducting interest on Mortage loans, £1,253, the available balance is £3,097. The directors recommend the following appropriation—Dividends on preference shares at the rate of 5 per cent. (less income-tax) £601, ordinary shares at the rate of 3 per cent. (less income-tax), making with the dividend paid in September 4 per cent. for the whole year, £2,008, leaving a balance of £488 to be carried forward. The traffic receipts show an increase of £2,051 as compared with the corresponding half-year of 1919. On the whole year there was an increase of £6,579.

THE BRITISH TRUST ASSOCIATION has purchased from the Tramways, Light and Power Company, which owns and operates six electric power and traction enterprises in the Midlands, £200,000 8 per cent. five year notes at 95½, less a commission of 1 per cent. The public have been invited to subscribe for the issue. The notes are part of an issue of £375,000 and are redeemable at £105 not later than January 7, 1926. The holders will be in a better position than mere unsecured creditors, as there has been deposited with trustees for their special security notes and bonds to the value of £612,000 of three undertakings in which the company is interested. The notes will be a floating charge on the assets of the company, amounting to £2,442,000 debenture stock.

YORKSHIRE (WEST RIDING) ELECTRIC TRAMWAYS COMPANY, LIMITED.—The directors' report for the year ended December 31, 1920, states that, after providing for debenture interest and including the amount brought forward of £1,386, there is an available balance of £30,061 18s. 5d. A dividend of 6 per cent. per annum, less income tax, on the 6 per cent. cumulative preference shares, requires £9,715, and the balance, amounting to £20,347, was carried to renewals, depreciation and reserve fund in lieu of accident insurance. The total revenue amounted to £172, 868, as compared with £157,086 in 1919, and the operating and general expenses to £120,169, as compared with £92,171 in the previous year.

GLASGOW TRAMWAYS FINANCE.—After a long and acrimonious discussion, Glasgow Town Council, at its meeting on February 3 refused to make a grant of £10,000 to the Special Committee on Unemployment. In a communication from the City Chamberlain it was stated that there might be a shortage in the Common Good account of about £100,000, owing to the fact that the tramway undertaking would probably not have any surplus revenue to pay that fund. Councillor Kelly said that the tramway system was worth not less than £4,000,000 of capital, but unfortunately during the last financial year costs and wages were so high that the revenue was not sufficient to meet them, and the year finished with a very large debit balance. He considered that the tramways would not be run in a proper financial position until they were able to return 5 per cent. on the capital sum.

CHATHAM AND DISTRICT LIGHT RAILWAY.—The report for the year ended December 31, 1920, shows that the total revenue has amounted to £21,541. Deducting rent of Rochester Corporation line, £3,743, interest account, £2,403, and transferring to reserve for depreciation, £6,000, there is a balance of £9,395, and including the balance brought forward, £12,788. An interim dividend at the rate of 5 per cent. for the half year ended June 30, 1920, on the preference and ordinary shares absorbed £5,590, and the directors recommend that out of the balance a dividend at the rate of 5 per cent. be paid on the preference and ordinary shares, leaving £1,608 to be carried to the next account. The revenue showed an increase of £11,871, and expenses an increase of £16,539, as compared with the receipts and expenses of the previous year. The car mileage aggregated 1,039,634, as compared with 979,983. The company now works 14·98 miles and has fifty cars.

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PROVINCIAL TRAMWAYS COMPANY.—For the year to September 30 last, the net revenue received from the local companies has been £40,016, against £55,644 last year. The operations of the company have been carried out during the past year under great difficulties, intensified by the abnormal cost of materials and labour. To the amount of net revenue from local companies £40,016, is added the amount brought forward, £10,804, transfer fees £23, interest £2,262, income tax deducted from dividend warrants £8,162, making £61,267. Deduct administration expenses £2,628, income tax £9,712, debenture interest £8,750, written off War Loan investments, £1,500, claim of Crown for excess profits duty 1919 (under appeal) £10,000, etc. The directors place to reserve and depreciation account £10,000, and recommend a dividend on the ordinary shares of 10d. per share, making 1s. 6d. per share, or at the rate of 7½ per cent. for the year, carrying forward £3,008.

LONDON UNDERGROUND COMPANIES' DIVIDENDS.—The appended table shows the dividends announced on February 3, for the year 1920, as compared with the preceding twelve months.

	Final Divs. per cent. per annum.		Total for the year. Per cent.		Carried forward. £	
	1920	1919	1920	1919	1920	1919
Underground Electric Income Bonds	2*	2*	2*	4*	20,236	34,000
Central London Def.	—	—	½	3	15,160	11,762
London Electric Railway (£10)	2	1¼	1⅝	1⅝	22,350	20,942
City and South London	2½	2	1½	2	13,820	19,750
London General Omnibus	10*	3*	5*	7*	58,843	59,726
Metropolitan District Five per cent. 2nd Pref.	3½	3	3	4	20,537	22,098

*Free of income-tax.

The first half of the year was disappointing owing to the great increase of working expenses. With the higher fares sanctioned during the second half of the year an improvement resulted, but the total dividends for the year show a falling off in comparison with 1919. (Further particulars are given in the following page.)

DUBLIN UNITED TRAMWAYS COMPANY.—The accounts for the year ended December 31, 1920, show that the amount available for division is £95,941, interim dividends amounting to £21,840 having been paid on July 31. The directors recommend a dividend at the rate of 6 per cent. less income tax on the preference stock, and a final dividend at the rate of 7 per cent., less income tax, for the half year, making 5½ per cent. for the year on the ordinary stock; that £30,000 be set aside towards the deferred renewal of rails, and £2,000 written off the price of investments. The dividends and sums set aside will absorb £82,610, leaving £13, 331 to be carried to the next account. The directors record with regret the death during the year of Sir Robert Gardner, who had been one of the company's auditors for over forty years.

	1920	1919	1918	1916
RECEIPTS—	£	£	£	£
Traffic receipts	601,347	559,501	443,401	319,612
Parcels delivery	9,298	10,054	7,725	6,987
Advertisements	4,222	3,908	3,742	3,980
Carriage of goods	6,392	4,553	3,635	2,094
Other receipts	2,671	2,620	2,653	2,662
Total receipts	623,930	580,636	461,156	335,335
EXPENSES—				
Working and general	497,784	374,541	310,946	213,587
National insurance	1,464	900	877	915
Repairs to cottages	1,818	1,677	1,454	1,191
Parcel delivery	7,569	7,704	6,364	4,143
Goods carriage	3,488	2,815	2,293	1,025
Total expenses	512,123	387,637	321,934	220,861
Balance on working	111,807	192,999	139,222	114,474
Balance from last account	17,080	13,263	13,461	13,045
Interest	5,974	6,860	2,842	1,650
Total balance	134,861	213,122	155,525	129,169
DEDUCTIONS—				
Interest on debentures	20,483	20,719	20,490	22,868
Wayleaves	11,058	11,058	11,247	12,107
Payment to Howth Co.	3,000	3,000	3,000	3,000
Renewals &c.	4,379	30,074	3,295	—
	38,920	64,851	38,032	37,975
Balance available for division	95,941	148,271	117,493	91,194
Div. on Pref. shares, 6 per cent. for year	25,200	25,200	25,650	27,900
Interim div. on Ord. shares for half year	9,240 (4% p. ann.)	11,550 (5% p. ann.)	9,570 (4% p. ann.)	10,560 (4% p. ann.)
Final div. on Ord. shares	16,170 (7% p. ann.)	16,170 (7% p. ann.)	13,860 (6% p. ann.)	12,375 (5% p. ann.)
Bonus on Ord. Shares	—	4,950	3,300	—
Reserve for renewals of permanent way	30,000	30,000	35,000	20,000
Reserve and renewals fund	—	39,321	15,000	7,000
Balance to next account	13,331	17,080	13,263	13,359
Written off investments	2,000	4,000	1,850	—
	95,941	148,271	117,493	91,194
Car mileage	7,498,147	6,926,331	6,787,654	7,440,614
Energy consumption	14,565,346	12,897,394	12,303,241	13,007,405

TRAMWAY AND LIGHT RAILWAY NOTES.

BELFAST.

COST OF TRACK RECONSTRUCTION.

Belfast Corporation are faced with a heavy outlay on the reconstruction of the tramway tracks. The work has necessarily fallen into arrears during the last six years, and it is estimated that if thorough repairs are carried out throughout the system, an expenditure of about £2,000,000 would be necessary.

BIRMINGHAM.

RAILLESS TROLLEY CARS.

Accompanied by the Lord Mayor (Mr. W. A. Cadbury), a deputation from the Tramways Committee, on January 20, visited Bradford for the purpose of inspecting the railless trolley car service and investigating the question of running such cars instead of renewing worn-out tramway tracks. In particular the deputation desired to see the double deck railless car which the Bradford Tramways Committee propose using on several sections, in lieu of relaying the tramways. Subsequently the Corporation decided to construct one railless line as an experiment.

BRISTOL.

NEW MINIMUM FARE.

The Tramways Company recently instituted a minimum fare of twopence.

BURNLEY.

HIGHER FARES.

Under an order issued by the Ministry of Transport, Burnley Corporation have received powers to increase the statutory fares on the tramways up to 1½d. per mile, or a portion thereof, instead of 1d. as at present, with a minimum fare of 2d. It is, however, not expected that short distance fares will be increased, but that additions will be made to long distance fares. The fares for workmen will probably be increased from an average of ½d. to an average of ¾d. per mile.

EDINBURGH.

OMNIBUSES SUPERSEDE CABLE TRAMCARS.

A further scrapping of Corporation cable tramways in Edinburgh has been decided upon and the installation of a service of motor omnibuses. It has also been decided to experiment with services of motor omnibuses to Barnton, Cramond and Corstorphine as soon as vehicles are available.

GLASGOW.

EXTENSION SCHEMES, £800,000.

The Glasgow Corporation are sending a deputation to Bradford to study the working of railless traction. It is suggested that experiments in this form of traction may assist the Corporation in dealing with tramway extension schemes. A number of these, 19 miles in extent, were authorised in 1914, but have not been carried out. At to-day's prices the cost would be £800,000.

HUDDERSFIELD.

TRAMCAR ROAD RIGHTS—WORKMEN'S FARES.

His Honour Judge Bairstow gave judgment against the Huddersfield Corporation in a case at the Huddersfield County Court on January 12, in which the British Dyestuffs Corporation sued the Council for £26 16s., damage to a motor vehicle by a tramcar. The Judge said the case was absolutely undefended. The view, he said, of the insurance corporation was that the car had a right to go tearing along the high road, and as he understood from that case, had a prior right to that portion of the track on which it ran. It was only from any such theory that the case could have been defended. The facts from the evidence were that the car ran into the lorry and pushed it along for about two yards, and caused considerable damage. There was no evidence of negligence on the part of the driver of the lorry. The general manager of the tramways would be wise if he impressed upon his drivers that their rights were the same as other people's, and not superior. He had no hesitation whatever in finding the case for plaintiffs, allowed costs and special fees.—At a meeting of the Council, the Chairman of the Tramways Committee (Councillor E. H. Sellers), said that some tramway undertakings were applying for permission to abolish workmen's fares. If the finances of their own undertaking did not improve during the next two or three months the Committee would have to ask the Council to do the same.

LONDON.

EMPLOYEES' PAY FOR CHRISTMAS DAY—TICKET CANCELLING MACHINES.

The County Council have ordered that overtime payment for working on Christmas day should be made to workmen, telephone operators, &c., of the tramways department the same as to the traffic employees. Some time ago the Council approved a capital estimate of £900 for the manufacture of 1,500 ticket-cancelling machines, and later a supplementary estimate of £120 for a further 200 machines was passed. The Highways Committee have reported that the total expenditure on the 1,700 machines amounts to £1,092 10s. 2d.

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LEICESTER.

POWERS FOR ENFORCING QUEUES.—HIGHER FARES ON SUNDAYS AND HOLIDAYS.

Among the powers sought by the Corporation in their Parliamentary Bill to be promoted next session are a requirement that intending passengers are to form queues, and that higher fares shall be charged on Sundays and holidays.

LIVERPOOL.

FIRST-CLASS CARS.

The Liverpool Tramways Committee have considered the proposal of one of its woman Councillors, Mrs. Stewart Brown, to discontinue the running of first-class tramcars in the city and that uniform fares be charged on all cars. It was decided, however, to continue the service as at present.

MATLOCK.

THE CABLE TRAMWAY.

A new system has been introduced into the working of Matlock cable tramways; steam power, on which the undertaking has hitherto been run, has been abandoned in favour of a suction gas plant, which, it is estimated, will effect considerable saving on running costs. The tramway undertaking, which was laid down 30 years ago at a cost of £20,000, was later presented to the town by Sir George Newnes, a native of the district. The tramway includes some of the steepest tramway gradients (ranging up to 1 in 5) in the country.

PERTH.

WORKMEN'S FARES DOUBLED.

The Corporation has received authority from the Ministry of Transport to raise workmen's fares by 100 per cent.

SOUTH SHIELDS.

NEW ROLLING STOCK.

The rolling stock of the South Shields Corporation tramways is being increased by the addition of five double deck cars, which have been purchased at an average cost of £3,300 each. The new cars will seat eighty-two passengers, as compared with fifty-two in the older cars.

STRETFORD.

NEW CONSTRUCTION AND EQUIPMENT.

Stretford Urban Council have applied for sanction to the borrowing of £64,000 for the purposes of tramway construction and equipment as follows—£17,000 for the construction and equipment of a single line of tramway extending throughout the length of Upper Chorlton Road, approximately 1,203 yards, making with the existing line a double line throughout; £43,500 for the construction and equipment of a double line of tramway along Seymour Grove for a distance of approximately 1,528 yards, and £3,500 for the construction and equipment of a line of tramway (partly single and partly double) along Talbot Road connecting with the said Seymour Grove tramway and the existing tramway in Talbot Road, approximately 246 yards in length (single track).

WALTHAMSTOW.

FARES QUESTION.

The Sub-Committee of Walthamstow Council appointed to go into the question of tramway finance have reported that there is no hope at the present time of materially reducing expenditure. They have been unable to agree to the proposal to introduce cheap mid-day fares and have decided that if the position is to be improved it can only be done by increasing the ordinary fares. They recommend that 1d. fares be increased to 1½d., with certain exceptions. All other fares to remain as at present with the exception of those on the Rising Sun route, where the 1d. fare should be abolished and one fare only of 2d. be charged for any distance. No alteration should be made in workmen's fares or fare stages. They recommend that application be made to the Ministry of Transport for an order to authorise a general increase in charges.

YORK.

2d. TO BE THE MINIMUM FARE.

The Tramways Committee report that the Ministry of Transport have issued their Order authorising the Corporation to charge (*a*) 2d. for any single complete journey, except in the case of special cars, provided for by Section 66 of the York Corporation Light Railways Order, 1908; (*b*) in respect of artisans', mechanics', and daily labourers' fares not exceeding the fares charged to such persons in operation on July 10, 1920, with an addition of one-halfpenny to every such fare. The new fares were put into operation on December 13, 1920. The Order provides that the Corporation shall not make any payment out of the revenue of the undertaking to the credit of the borough fund or in relief of rates in any year until they have made reasonable provision for the proper repair, maintenance and renewal.

UNDERGROUND GROUP RESULTS.

The reports of the London Underground Group, including the London General Omnibus Company, were issued on February 9. They show total traffic receipts £10,895,881, an increase of £1,785,411 but operating expenses absorbed £10,378,847, or £2,199,249 more than in 1919, making the net receipts £274,8611 ower at £1,222,381 (including £705,347 Government compensation to the Metropolitan District Railway). The number of passengers rose 98,309,320 to 1,171,701,868, and the average fare was 2·18d. per head.

Particulars are appended—	1920	1919	Inc. or Dec.
LONDON GENERAL OMNIBUS CO.	£	£	£
Total net income	507,020	552,255	—45,235
Balance brought forward ...	59,726	60,930	—1,204
Amount to reserve	285,000	—	—
Dividend, per cent.	5	7	—2
Amount carried forward ...	58,843	59,726	—883
LONDON ELECTRIC RAILWAY—			
Total net income	564,561	611,602	—47,041
Balance brought forward ...	20,942	23,605	—2,663
Amount to reserve	45,000	—	—
Dividend, per cent.	1⅛	1⅝	—½
Amount carried forward ...	22,350	20,942	+1,408
CENTRAL LONDON RAILWAY—			
Total net income	166,569	186,916	—20,347
Balance brought forward ...	11,762	17,485	—5,723
Amount to reserve	20,000	—	—
Dividend, per cent.	2½	3½	—1¼
Amount carried forward ...	15,160	11,762	+3,398
METROPOLITAN DISTRICT RAILWAY—			
Total net income	539,840	565,611	—25,771
Balance brought forward ...	22,098	21,332	+766
Amount to reserve	45,000	—	—
Dividend, per cent.	3	4	—1
Amount carried forward ...	20,537	22,098	—1,561
CITY AND SOUTH LONDON RAILWAY—			
Total net income	138,389	144,487	—6,098
Balance brought forward ...	19,750	24,566	—4,816
Amount to reserve	25,000	30,000	—5,000
Dividend, per cent.	1½	2	—½
Amount carried forward ...	18,820	19,750	—930

RATES FOR CURRENT YEAR.

CONTRIBUTIONS TO AND FROM TRAMWAY UNDERTAKINGS.

Mr. W. Allison Davies, borough treasurer of Preston, has issued, for the thirty-sixth year, his useful annual return showing the rates levied in various towns (1920-21) together with charges for gas, water and electricity for household purposes, and the profits and loss on municipal undertakings by which the rates have been reduced or increased. The profits transferred from industrial undertakings in relief of rates and losses in respect of which a rate in aid is levied are also given. The following are the estimated amounts transferred from tramway undertakings in relief of rates, and transferred from the rates to tramway undertakings—

AID TO RATES FROM TRAMWAYS.		RATE AID TO TRAMWAYS.	
Belfast	£8,960	Burton-upon-Trent ...	£1,500
Birkenhead	9,030	Coventry	3,524
Blackpool	10,000	Darlington	3,426
Leeds	137,716	East Ham	21,655
Manchester	111,891	Exeter	2,000
Newcastle-on-Tyne ...	14,000	Gloucester	12,720
Nottingham	18,131	Ipswich	2,500
Salford	25,000	Reading	4,331
Smethwick	1,500	St. Helens	14,650
Southend	5,000	West Ham	107,996
Sunderland	5,000	Colchester	1,000
Swansea	500	Colne	2,500
Wallasey	18,000	Lancaster	1,723
Warrington	5,000	Rawtenstall	1,500
Nelson	36	Stalybridge	750
Shipley	119	Swindon	1,960

Warrington has to meet a subsidy on the omnibus undertaking of £2,000, amounting to a 2d. rate, while at Widnes the contribution to the omnibus undertaking is £1,389, equivalent to a rate of 2¼d.

LONDON UNDERGROUND GROUP APPOINTMENTS.

The following appointments were announced on January 29 by the Directors of the Underground group of companies—

Assistant Managing Directors, Mr. H. E. Blain and Mr. F. Pick.
Director for Construction (railways), Mr. Z. E. Knapp.
Chief Engineer (omnibuses), Mr. G. J. Shave.
Chief Engineer (railways), Mr. A. R. Cooper.
Secretary and Treasurer, Mr. J. C. Mitchell.

At the same time, the management of the London and Suburban Traction group has been brought into direct connection with the Underground management, and the following appointments have been agreed—General Manager, Mr. C. J. Spencer; Secretary and Treasurer, Mr. E. Boys.

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PERSONAL.

Mr. J. H. Birch has been appointed rolling stock superintendent of Wigan Corporation Tramways.

Lord Ashfield has joined the board of the United Railways of the Havana and Regla Warehouses, Limited.

Mr. J. H. B. Noble has been elected vice-chairman of Sir W. G. Armstrong, Whitworth and Company, Limited.

Mr. J. W. Barnes, commercial assistant in the Sheffield Corporation electric supply department, has been granted an increase in salary from £600 to £700.

Mr. Arthur Ellis, of Messrs. Arthur Ellis and Partners, of Cardiff, has recently been retained to advise Stafford Corporation in connection with electricity problems.

Mr. H. C. Honey has been appointed a director of Gas Administration in the Power Transport and Economic Department, Board of Trade Offices, Great George Street, S.W.1.

Mr. J. B. Hamilton, general manager of the Leeds Corporation Tramways, has been retained by Yarmouth Corporation Tramways Committee to advise generally on their tramway undertaking.

His Majesty has authorised the Viceroy of India to confer the honour of Knight Bachelor on **Mr. William Mitchell Acworth,** who is at present in India, in connection with the preparation of a report on the position of the railways there.

Mr. R. L. Acland, M.I.E.E., has joined the staff of the Agricultural and General Engineers, Limited, of Central House, Kingsway, W.C., and will be in charge of their electrical interests in the North of England, including the Garrett electrical vehicle.

Mr. Llewelyn B. Atkinson, who became secretary of the Cable Makers' Association during the war, will in future act and sign as director. The secretary in future will be Mr. W. C. Stiles, who has acted as assistant secretary for some time past.

Sir Thomas Williams, late general manager of the London and North-Western Railway, has been appointed by the Minister of Transport a member of the committee set up to inquire into the running by the railway companies of road services for goods traffic.

Councillor W. G. Turner was, on February 7, re-elected chairman of Belfast Tramways Committee for the year 1921-22. In returning thanks he remarked that the past year had involved consideration of such important matters as track reconstruction, increased fares and improved facilities. Councillor Anderson was re-elected vice-chairman.

Halifax Tramway Management.—Halifax Tramways Committee have decided to recommend the Council to offer a salary of £900 per annum for a general manager of the tramways. They have also asked the Council to approve that three months' notice be given to Mr. J. D. Caird to terminate his appointment as traffic manager, and that after that period a gratuity of £250 be paid to him; the question of the continuation of this grant to be raised after a year.

Mr. A. G. M. Jack, C.B.E., who has been deputy chairman of Messrs. Hadfields, Limited, for many years, and is now retiring from that position, has been presented by the commercial, technical and drawing office staff of the Hecla and East Hecla Works, with a solid silver tea service. Other gifts included an oak timepiece and three silver cake stands. Mr. W. E. Parker, O.B.E., presided at the presentation and was supported by Sir Robert Hadfield and other directors and officials of the firm.

Mr. George Thomas Jackson, J.P., former Alderman of the Salford Corporation, who has just died, entered the service of the Manchester Carriage and Tramways Company as conductor. When aged 29 he left the company to form the Tramway and Vehicle Workers' Union, of which he became general secretary. He became a member of the Salford Corporation, and his strong advocacy of municipalisation caused the Council to promote the Bill under which they took over the tramways. He resigned from the Council four years ago owing to ill-health.

Councillor H. W. Wale, three years vice-chairman and three years chairman of the Coventry Corporation Tramways Committee, having just retired from the latter position, has been presented by the staff and employees with an illuminated address and a silver cigarette case. Mr. T. R. Whitehead, general manager, made the presentation. Mr. Wale has been a member of the Tramways Committee for ten years, and the address says—"He has at all times maintained a high standard of equity and justice between the staff and the public, and his future career will be watched with interest by the friends he has made in the Tramways Department. who wish him all the success his work deserves."

Councillor J. Timpson, who has been three times elected mayor of Portsmouth, and who has been chairman of the Tramways Committee for many years, is to receive at the hands of the Japanese Ambassador the insignia of the Order of the Knight of the Sacred Treasure. The warrant authorising Councillor Timpson to accept the decoration has been signed by H.M. the King. It is understood that the honour has been conferred on Councillor Timpson by the Emperor of Japan in recognition of the services rendered by him to the Japanese Navy on the occasion of the visit of the Japanese squadron to Portsmouth in February, 1919. The "Portsmouth Evening News" remarks that no mayor of Portsmouth has better deserved recognition at the hands of his native country than has Councillor Timpson during his lengthy period of office, in which he has proved a most worthy civic chief and has done an incalculable amount of work for the town and nation. We join with our contemporary in the hope that the honour which has just been conferred on the mayor will not be the most important that he will receive.

CONTRACTS AND ORDERS.

The Equipment and Engineering Company have received an order for five "Celerity" automatic rail grinders for Plymouth Corporation Tramways.

Bradford Tramways Committee have accepted a tender for 100 steel tramcar tires from the Anglo-Belgian Improvements Corporation at £401 10s.

The British Insulated and Helsby Cables, Limited, are to supply 2,000 copper rail bonds to Bradford Corporation Tramways at the schedule price, which is estimated at a total of £316.

Birkenhead Electricity Committee have accepted the tender of the British Thomson-Houston Company, Limited, for the supply and erection of high tension switchgear, for the sum of £4,003.

Burnley Tramways Committee have accepted the tender of a Belgian firm for tires at £37 10s. a ton. This price is about £22 lower than the nearest British tender. The pre-war price averaged about £19 per ton.

Bolton Tramways Committee have accepted the tender of the English Electric Company, Limited, for twenty D.K. 20A unventilated 40 H.P. motors, twenty D.K. form K3 B type controllers, twenty D.K. type D, form A circuit breakers, ten lightning arresters, and ten sets of D.K. 7 magnetic track brakes.

Leigh Town Council has accepted the tender for a 2,500 KW. turbo-alternator from Fraser and Chalmers Engineering Works, at £18,694, for E.H.T. and L.T. switchgear from Ferguson, Pailin, Limited, £2,420, for a 500 KW. Peebles La Cour converter from Bruce Peebles and Company, Limited, at £4,070.

The Brush Electrical Engineering Company, Limited, have informed the East Ham Tramways Committee that they hope to deliver the cars now under construction at the end of February or the beginning of March. The committee have agreed to an additional increase of £108 per car in the contract price of four cars on account of the increase in wages and cost of railway carriage.

Sandberg's "Insitu" Rail Hardening Process.—Messrs. Scholey and Company, Limited, 56, Victoria Street, Westminster, have recently secured orders from the Birkenhead, Wallasey, Liverpool, Newcastle, and Glasgow Tramways for the treatment of 23 miles of track by the "Insitu" process. Up to date Messrs. Scholey have obtained orders for the treatment of over 130 miles of track on 22 of the principal tramways in the United Kingdom.

The Glasgow Tramways Committee recommend that the following offers be accepted—(1) Iron and steel, P. and W. MacLellan, Limited, and R. Laidlaw and Son, Limited; (2) transformer oil, Vacuum Oil Company, Limited; (3) Monroe calculator, National Office Equipment Company; (4) 19½·080 S.C.L.C. cable, W. C. Martin and Company; (5) ·070 D.C.C. wire, the London Electric Wire Company and Smith's, Limited; (6) white metal, Dewrance and Company; (7) fibre ducts, the Key Engineering Company, Limited.

BUSINESS NOTICES.

MESSRS. ALLEN AND SIMMONDS.—The statements which have appeared in the press to the effect that Messrs. Allen and Simmonds (Reading) Limited, are about to close, have caused the firm considerable annoyance and loss. Mr. R. Allen, the managing director, desires to make it clear that it is not the firm's intention to close, although they have given notice that a certain number of employees will probably be released.

KARRIER MOTORS, LIMITED, of Karrier Works, Huddersfield, propose to transfer to their London office their entire sales organisation, and from February 7, all matters relating to sales will be conducted from 66-68, Victoria Street, Westminster, S.W.1. The works will as formerly deal with service and repairs, and all communications respecting matters of this kind should continue to be addressed to Karrier Works, Huddersfield.

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DURHAM COUNTY TRAMWAYS PROJECT.

AN ESTIMATED OUTLAY OF £1,631,473.

A special meeting of Durham County Council was held on January 12, to decide upon the expediency of confirming the decision to promote a County Transport Bill in Parliament. An estimate of the cost of the scheme showed that the total outlay would be £1,631,473, the main items being—Construction of tramways and tram-roads, £847,122; electrical equipment, £397,777; tramway rolling stock, £120,000; trolley vehicles, £143,000.

The Chairman (Mr. P. Lee) expressed the view that the scheme was one that the Council ought to place before Parliament, and that they should carry into effect if Parliament sanctioned it. Either by private or by public enterprise the county must be served, and he thought the County Council service would be more efficient than private enterprise.

Alderman W. N. Smith, in moving that the Bill be proceeded with, said there was a period of seven years over which the operations would be extended, and the Council could decide how the money should be spent during that time.

The rejection of the proposal was moved by Mr. Kellett (Eldon) who declared that the Council had received insufficient information to form a judgment. He contended that a tramways scheme was entirely out of date, and if additional transport facilities were required provision should be made for omnibuses.

Sir A. M. Palmer, Bart., opposed on account of the great expense. He did not think Parliament would sanction the scheme, which had met with opposition from all quarters in the county, including the landowners and the coalowners. Already they had spent from £5,000 to £10,000, and he suggested that they should drop the proposal.

Mr. W. Dillon said private enterprise was prepared to provide a service that would be convenient to the public. Motor transport could be run more efficiently by private enterprise.

The result of the voting showed 46 for proceeding with the Bill and 13 against. As this in not an absolute majority, a subsequent meeting to deal with the subject will probably be held.

Newcastle Corporation have decided to petition against the Bill in order to safeguard their interests in motor omnibus services run to Blaydon and elsewhere.

Romford Urban Council have invited the London General Omnibus Company to extend their services from Ilford to Romford Town. Before acceding to this request the company have asked the Ilford Council to have an informal conference with the company

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PATENT LIST

Abstracted for "The Tramway and Railway World" from the Official Journal of Patents.

***** If the inventions have been communicated the names of the communicators are given in italics.**

APPLICATIONS FOR LETTERS PATENT.

The number of the patent is given in brackets.

Direction indicators for motor vehicles (886)—J. Akers, E. A. Galloway, and E. Ison.
Steering devices for motor vehicles (391)—M. Birkigt.
Application of air pressure for operating motor vehicle mechanism and apparatus therefor (75)—A. A. Govan.
Change-speed gears for motor vehicles (650)—S. de Kousminsky.
Braking mechanism for automobiles (673)—J. E. Landry.
Brakes for steering wheels (674)—J. E. Landry.
Lifting jacks (40 and 41)—McKiernan-Terry Drill Company and A. E. White.
Electrical transmission arrangements for motor vehicles, etc. (880)—W. A. Stevens.
Rail joints (271)—J. E. Taylor.
Alignment and jointing of rails of tramways (1,041)—D. L. Thomas.
Railless tramway, etc., vehicles (176)—R. H. Wilkinson.
Steering axle ends for motor vehicles (1,742)—S. E. Alley.
Rail joints (1,519)—O. C. Arboren.
Swivelling shoe collector for collecting electric power from overhead conductor (1,740)—F. H. Briggs.
Rubber tires for wheels of motor vehicles (2,029)—J. Briggs.
Motor vehicles (1,868)—J. E. R. Brougham.
Direction indicator for road vehicles (2,107)—O. T. Glover.
Single-deck tramcars (2,016)—W. E. Hall.
Tramway vehicles (2,017)—W. E. Hall.
Apparatus for filing surface of tramway rails (1,899)—C. Oxley.
Reaction shock-absorber for motor vehicles (1,444)—J. P. A. M. de St. Martin.
Lifting jacks (1,697)—F. J. Wood.
Tramcar seats and seat backs (2,346)—S. J. Aukland.
Electric motor control (2,685)—British Thomson-Houston Company, Limited, and H. C. Hastings.
Self-propelled vehicles (2,668)—W. Brundson.
Lubricating systems for motor vehicles (2,257)—J. H. Dickinson.
Lifting jack (2,265)—J. Golding and R. F. C. Webb.
Lubrication of motor vehicles (2,354)—S. S. Guy.
Lifting jacks (2,428)—G. C. E. Hampden.
Lifting jacks (2,731)—G. A. Mortier.
Mechanical direction indicator for road vehicles (2,796)—J. C. Reeves.
Jacks (2,289)—J. Tatton.
Safety guards for self-propelled road vehicles (2,463)—J. Tawn.
Transmission gear for motor vehicles (2,412)—J. S. Wilkerson.
Steering gears for motor vehicles (3,163)—S. E. Alley.
Motor charabancs (3,424)—G. A. Birchley and A. Harvey.

SPECIFICATIONS PUBLISHED.

1919

Brakes for motor-driven vehicles (21,433—*154,976*)—J. H. C. Faire.
Lifting jacks (21,908—*155,003*)—Lake and Elliot, A. E. Lake, and A. D. Powell.
Axle and steering wheels of motor vehicles (22,170—*155,022*)—E. S. Alexander.
Lifting jacks (29,103—*155,102*)—W. B. Templeton.
Lifting jacks (19,299—*155,321*)—W. H. Sharpe.
Change-speed gearing for self-propelled vehicles (15,014—*155,312*)—E. J. Rigby and P. C. Clarke.
Apparatus for mechanically operating the points of tramways from the vehicles (23,538—*155,390*)—C. B. Smith.
Device for stopping vehicles running on rails (23,427—*155,649*)—E. H. Wallander.
"In motion" recorders for vehicles for road or rail (23,695—*155,659*)—H. Hollingdrake.
Lifting jacks (29,873—*155,700*)—A. E. Lake.
Apparatus for operating the brakes of vehicles (18,909—*155,868*)—W. H. Tinson (*P. C. Saccaggio*).
Motor vehicles (28,452—*155,972*)—J. R. Kingston and W. H. Powell.
Chassis for motor vehicles (28,752—*151,577*)—C. Rouquet.
Life guard for the front wheels of motor omnibuses, etc. (31,038—*155,986*)—L. Randerson.

1920

Spring arrangements for motor vehicles with front wheel driving mechanism (18,125—*145,765*)—Daimler Motoren Ges.
Motor operated starting mechanisms for automobile engines (26,914—*152,988*)—Metropolitan-Vickers Electrical Company.
Tramway rails (4,010—*155,478*)—W. J. Sells.
Rail joints (14,253—*155,506*)—J. Szarek.

CHIEF DRAUGHTSMAN.

The English Electric Company, Limited, Dick, Kerr Works, Preston, require the services of a first-class Chief Draughtsman. Must have had experience in a similar position and in the manufacture of Electrical Machinery and Rolling Stock for Railways and Tramways.

Apply, stating experience, age, and salary expected, to Works Manager, Dick, Kerr Works, Preston.

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TRAFFIC RETURNS.

Tramway and Omnibus Undertakings in the United Kingdom.

NAME OF COMPANY OR CORPORATION.	1920. WEEKS ENDED					1921. WEEKS ENDED					AGGREGATE.		
	Jan. 10	Jan. 17	Jan. 24	Jan. 31		Jan. 8	Jan. 15	Jan. 22	Jan. 29		Wks.	1921.	Increase or Decrease.
	£	£	£	£	£	£	£	£	£	£		£	£
Aberdare Corporation	581	560	...	586	...	670	627	...	577	...	43	27,301	+ 3,136
Aberdeen Corporation	3,351	3,009	2,976	2,935	...	4,034	3,604	3,400	3,435	...	34⅘	134,693	- 21 522
Ayr Corporation	461	456	466	455	...	632	522	547	553	...	37	29,474	+ 2,924
Barrow Corporation	620	681	681	728	...	879	881	862	900	...	43	39,032	+ 6,285
Belfast City Tramways	10,115	10,370	10,546	10,361	...	11,064	11,074	11,308	11,310	...	44	502,337	+ 49,550
Birkenhead Corporation	2,909	3,007	2,967	2,983	...	3,196	3,040	3,083	3,102	...	43⅛	144,173	+ 16,062
Birmingham Corporation	26,140	26,736	26,898	26,649	...	33,098	33,220	33,194	32,993	...	44	1,369,391	+ 230,703
Birmingham Motor 'Buses	1,593	1,685	1,702	1,646	...	1,845	1,833	1,878	1,901	...	44	86,841	+ 11,472
Blackburn Corporation	2,103	1,954	1,952	2,039	...	2,431	2,395	2,315	2,512	...	43⅛	113,711	+ 14,097
Bradford Corporation	10,814	11,401	11,186	10,858	...	14,381	15,119	13,910	14,279	...	44	578,376	+ 78,874
Burnley Corporation	2,904	3,204	2,939	3,014	...	3,432	3,438	3,222	3,336	...	—	—	—
Burton-on-Trent Corporation	508	527	515	537	...	658	677	653	660	...	44	26,661	+ 4,279
Bury Corporation	2,134	2,232	2,163	2,194	...	2,489	2,352	2,373	2,479	...	43⅛	110,327	+ 7,371
Chatham and District	1,534	1,370	1,442	1,436	...	1,474	1,686	1,625	1,629	...	4	6,414	+ 632
Cork Electric	...	...	...	...	...	...	...	...	...	...	—	—	—
Derby Corporation	1,883	1,956	1,936	1,971	...	2,367	2,268	2,364	2,371	...	44	99,484	+ 13,911
Dundee City	2,543	2,362	2,445	2,401	...	3,518	3,202	3,087	3,210	...	36⅛	111,851	+ 18,838
East Ham Corporation	1,713	1,563	1,666	1,705	...	2,343	2,250	2,229	2,211	...	42⅔	89,929	+ 7,174
Edinburgh Corporation (Cable)	10,975	10,245	10,353	10,321	...	12,910	10,810	10,651	10,381	...	37	444,448	+ 40,835
Edinburgh Motor 'Buses	229	241	256	278	...	2,625	2,293	2,373	2,721	...	—	—	—
Glasgow Corporation	31,293	31,845	32,906	33,638	...	47,927	44,476	45,428	46,454	...	34	1,564,191	+ 444,160
Glossop (Urban Elec. Supply Co.)	219	230	223	208	...	246	237	256	244	...	5	1,269	+ 166
Halifax Corporation	3,402	3,046	3,297	3,297	...	4,618	4,375	4,205	4,380	...	42⅔	182,924	+ 29,886
Halifax Motor 'Buses	85	77	82	82	...	125	117	117	117	...	42⅔	4,783	+ 1,158
Huddersfield Corporation	4,648	4,748	4,837	4,689	...	5,161	5,129	5,254	5,248	...	44	223,786	+ 9,932
Ilford U.D. Council	1,120	1,118	1,112	1,152	...	1,425	*890	*645	1,321	...	43⅛	56,038	- 4,437
Ipswich Corporation	773	808	801	798	...	898	869	821	816	...	43	42,425	+ 2,208
Isle of Thanet	478	478	486	485	...	570	551	505	520	...	16⅔	9,544	- 445
Kilmarnock Corporation	299	300	311	315	...	460	349	372	383	...	37	13,672	+ 2,800
Lanarkshire	...	...	...	...	...	...	...	...	...	...	—	—	—
Leicester Corporation	5,825	6,034	6,026	6,058	...	6,694	6,601	6,619	6,508	...	—	—	—
Leyton U.D. Council	...	...	...	...	...	...	...	...	...	...	—	—	—
Liverpool Corporation	25,049	25,625	25,358	25,102	...	27,865	26,851	26,495	27,014	...	4⅘	112,299	+ 6,884
London County Council	76,478	76,453	78,211	77,640	...	101,067	102,837	99,168	99,116	...	43	3,902,811	+ 471,497
Maidstone Corporation	360	371	358	340	...	535	475	419	410	...	43⅛	21,048	- 4,165
Manchester Corporation	29,308	30,008	30,067	30,181	...	39,084	38,325	38,171	38,696	...	44	1,492,835	+ 173,033
Newcastle-on-Tyne Corporation	8,488	9,083	9,177	9,135	...	11,516	11,256	11,121	11,648	...	42	479,187	+ 69,502
Nottingham Corporation	6,821	7,222	7,340	7,313	...	7,590	7,653	7,525	7,678	...	43	333,620	+ 20,258
Oldham Corporation	4,241	4,511	4,442	4,233	...	4,642	4,562	4,650	4,633	...	45	208,721	+ 10,048
Reading Corporation	1,436	1,543	1,578	1,511	...	1,620	1,700	1,546	1,594	...	43	73,094	+ 3,295
Reading Motor 'Buses	100	129	150	152	...	297	292	262	259	...	43	11,460	+ 10,625
Rotherham Corporation	2,134	2,258	2,168	2,291	...	2,913	2,696	2,621	2,778	...	42	112,194	+ 22,535
St. Helens Corporation	1,632	1,601	1,669	1,663	...	2,116	2,024	2,039	2,166	...	43	89,886	—
Sheffield Corporation	18,269	19,444	19,645	19,118	...	20,947	20,344	20,570	20,861	...	44⅔	925,881	- 182,815
Southampton Corporation	2,940	3,041	3,072	3,015	...	3,251	3,233	3,057	3,103	...	43	135,995	- 15,863
Southampton Motor 'Buses	171	173	187	179	...	333	310	247	210	...	43	10,672	+ 6,911
Southend Corporation	1,309	1,329	1,393	1,388	...	1,631	1,662	1,629	1,630	...	42	101,811	- 11,323
South Shields Corporation	1,313	1,371	1,445	1,407	...	1,940	1,845	1,902	1,983	...	44	84,294	+ 22,071
Sunderland Corporation	2,527	2,788	2,708	2,659	...	2,995	2,763	2,824	2,830	...	44	132,999	+ 7,573
Swindon Corporation	309	312	317	347	...	397	385	363	359	...	43	16,705	+ 1,020
Tyneside Tramways and Tramroads	940	888	1,005	1,000	...	802	1,115	1,119	1,129	...	4	4,165	+ 332
Wallasey Corporation	2,220	2,261	2,195	2,158	...	2,814	2,731	2,698	2,690	...	43⅔	113,727	+ 4,504
Walsall Corporation	1,564	1,631	1,622	1,621	...	1,928	1,975	1,982	1,997	...	44	78,343	+ 12,116
Walsall Motor 'Buses	661	675	710	711	...	1,344	1,366	1,385	1,419	...	44	50,547	+ 24,474
Walthamstow U.D. Council	1,603	1,692	1,727	1,758	...	1,963	1,886	1,869	1,908	...	43⅔	89,430	+ 14,728
Warrington Corporation	946	935	930	965	...	1,012	1,073	1,095	1,090	...	43	43,171	+ 4,327
West Ham Corporation	4,398	5,018	5,303	5,177	...	6,548	6,512	6,215	6,347	...	43⅛	250,271	+ 18,560
Wolverhampton Corporation	2,198	2,247	2,357	2,249	...	2,438	2,406	2,323	2,324	...	43	104,604	+ 14,822
Wolverhampton Motor 'Buses	340	355	355	350	...	579	630	604	616	...	43	19,343	+ 6,998

* Service suspended owing to Strike of Municipal Employees.

Colonial and Foreign Tramway Traffic Returns.

Companies Issuing Weekly Returns.

NAME OF COMPANY.	1920. WEEKS ENDED.					1921. WEEKS ENDED					AGGREGATE.		
	Jan. 10	Jan. 17	Jan. 24	Jan. 31		Jan. 8	Jan. 15	Jan. 22	Jan. 29		Wks.	1921.	Increase or Decrease.
	£	£	£	£	£	£	£	£	£	£		£	£
Anglo-Argentine	67,695	68,547	68,000	66,014	...	85,871	84,171	77,716	75,451	...	4	323,209	+ 52,953
Calcutta Rs.	95,373	98,281	93,199	85,542	...	97,389	102,159	101,061	*52,513	...	4	372,031	- 17,062
Madras... Rs.	(2 weeks)	4,883	...	...	...	(2 weeks)	38,198	...	...	...	2	38,198	+ 10,685
Pernambuco	7,684	8,475	8,176	8,107	...	4,512	4,789	4,278	4,672	...	4⅘	19,644	- 17,739

* Decrease owing to Strike.

Companies issuing Monthly Statements only.

	1919.					1920.	1920.					1921.	Wks.	AGGREGATE.	
	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.		1920-21.	+ or -.
	£	£	£	£	£	£	£	£	£	£	£	£		£	£
Ballarat & Bendigo	2,192	3,396	4,176	4,244	4,220	...	3,588	4,191	4,441	4,810	4,601	...	36	37,596	+ 5,566
Brazilian Trac. Mlrs	9734,000	9792,000	9980,000	9796,000	9739,000	...	11837000	12043000	1344200	12199000	12600000	...	52	134906000	+21832000
Brisbane	42,245	41,980	43,530	...	...	...	46,650	45,440	46,300	...	...	...	43	459,330	+ 69,420
British Columbia $	667,170	684,946	710,405	733,981	...	...	756,543	756,950	781,706	805,633	...	...	22	3,841,032	+ 402,440
Buenos Ayres L'c'z.	46,846	45,310	49,692	50,634	55,873	52,643	53,952	53,603	57,619	56,747	62,857	61,111	31	397,397	+ 51,178
Burma	43,683	43,152	51,898	46,755	43,571	...	48,552	50,980	55,763	53,679	50,481	...	21	259,455	+ 30,396
Cape Town	...	19,759	...	...	...	...	...	23,699	...	25,628	29,768	...	—	—	—
Carthagena & H.	2,991	1,539	1,465	2,549	2,923	4,748	3,721	2,273	3,319	2,714	5,560	3,877	5	3,877	- 871
Cordoba	17,627	17,833	17,606	11,255	14,923	...	21,032	19,612	19,636	19,141	19,307	...	39	178,483	+ 29,636
East India	2,761	2,831	2,855	2,709	2,916	2,988	4,109	4,228	4,299	4,234	4,271	4,299	26	25,440	+ 8,380
Kalgoorlie	2,876	3,005	3,095	2,859	...	...	3,111	3,361	3,094	2,969	...	...	48	33,672	+ 3,180
La Plata	5,729	5,541	6,194	4,905	...	*3,145	5,715	5,656	6,310	5,573	...	6,506	5	6,506	+ 3,361
Lima	49,021	49,144	50,087	...	...	...	58,851	56,513	49,054	...	...	...	44	54,261	+ 2,151
Manila $	194,018	...	242,441	248,350	276,730	...	292,760	...	327,652	320,345	315,599	...	52	3,419,389	+1,214,166
Monte Video	34,873	...	...	40,308	...	...	42,771	...	...	43,846	...	...	4	43,846	+ 3,538
Para	24,890	24,386	27,849	25,421	24,412	...	24,582	23,185	26,784	24,285	24,253	...	4	24,253	- 159
Peruvian $	...	982,850	1179,130	1285,000	...	...	...	1187,300	1187,160	935,050	...	...	22	5,633,655	- 38,239
Port Elizabeth	...	4,372	...	...	...	...	6,106	5,803	...	6,620	8,185	...	—	—	—
Rangoon	6,472	6,812	7,678	7,379	...	...	7,856	7,657	7,455	6,964	...	...	48	90,135	+ 11,785
Toronto $	1083,741	1124,159	1123,801	1111,177	...	...	1225,682	1270,651	1218,290	1250,414	...	...	48	13200,100	+1,646,664
Winnipeg $	353,194	381,248	428,339	461,449	...	...	368,616	426,647	444,899	477,957	...	...	48	4,754,505	+ 917,657

* Strike of employees.

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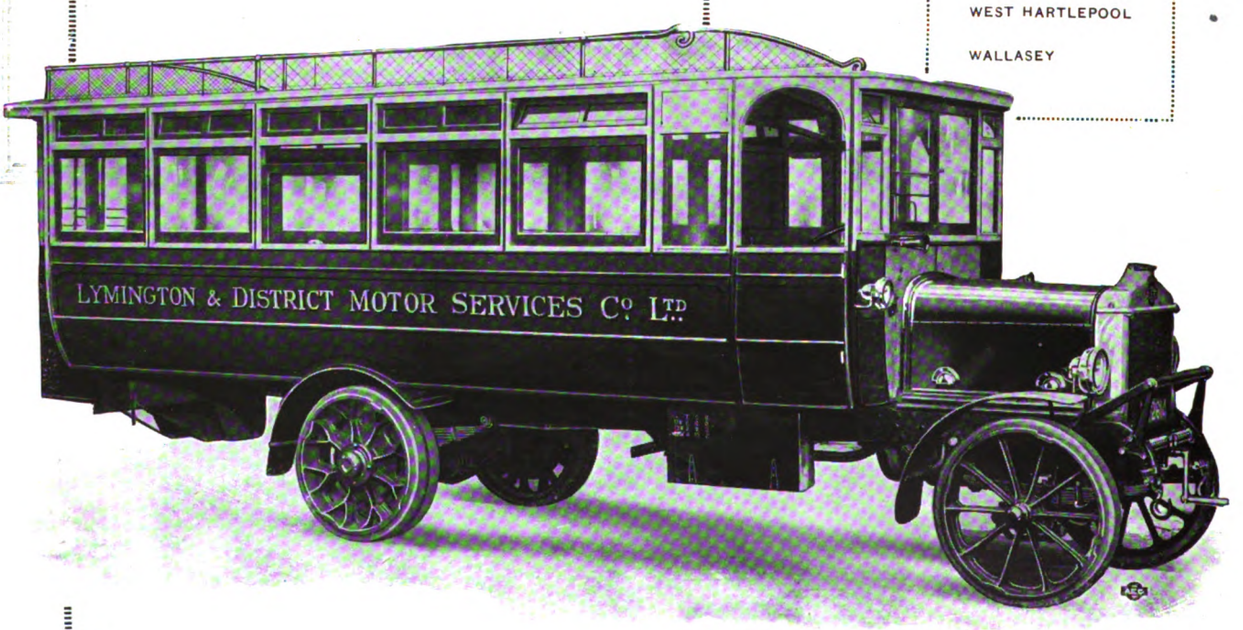

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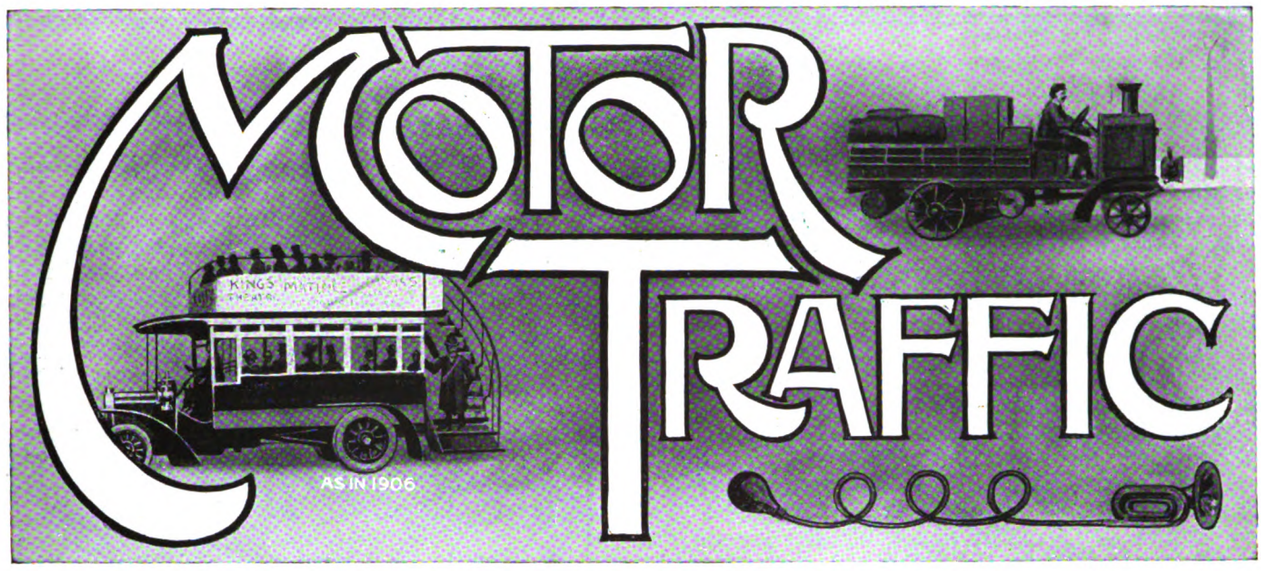

ROAD TRANSPORT BY RAILWAY COMPANIES.

A highly important matter now engaging the attention of the Ministry of Transport is the question of the conditions under which railway companies should be permitted to carry goods by road. The railway companies are already considerable users of motor vehicles. These they are permitted to employ for the collection and delivery of rail-borne goods. The most revolutionary suggestion now put forward is that there should be no limit to their powers to carry goods by road, whether these goods are also rail-borne on their system or not. The argument for the change is that the railway companies are subjected to severe competition by motor carriers, that these latter are not limited as regards their power to haul goods direct from point to point, and that the limitation imposed on the railways therefore prevents the latter from competing on equitable terms. This argument is in a sense a sound one. The question is whether, if the railways were given unlimited powers, competition between them and the road carriers would not be even more inequitable than it is at present. The railways are privileged corporations, each possessing something in the nature of a monopoly so far as haulage by rail is concerned. Other people are not permitted to create competitive systems of railways. Thus those which are authorised are given a position which from some points of view is very strong. They are, moreover, large corporations dealing in tonnages far in excess of anything that could be handled by a road carrier. Thus it may be argued that if the railways are privileged in certain respects, it is only reasonable that in other respects competing concerns should have an advantage over them.

OBJECTIONS TO UNRESTRICTED POWERS.

There are other arguments against the granting of unlimited powers. In considering any such matters we have to take into account the abuses which might result were powers of this kind given. If a railway is permitted to compete freely, it is certainly able, if it wishes to do so, to drive the local carrier off the road by establishing a directly competitive service of motors and undercutting of rates. Having by these means extinguished all competition on the roads in a certain locality, it would remain in the power of the railway to reduce its own road service to a negligible minimum, and so to compel traders to have their goods rail-borne. Road carriers would not, under such circumstances, spring up again, because the threat of the direct railway competition would always be over them. Thus the desired facilities for direct transport by road would be denied to the trader. Even if it proved possible to fix minimum rates below which direct road haulage by the railways would not be permissible—this arrangement being adopted to prevent undercutting and the extinction of competition—then, unless the minima were so high as in practice to exclude the railways from competition, their power of extinguishing their competitors would still remain. Their position as large buyers of vehicles and of supplies would secure for them preferential terms in almost every purchase. Consequently rates allowing a small profit to the railway would generally allow no profit at all to the competing carrier, who would therefore be driven off.

NATIONAL EMERGENCIES.

Another point of great importance is the position in the event of a national emergency, assuming that the railways were at the time the great providers also of road transport facilities. Should the emergency in question take the form of a railway strike, the country would be without the protection of the independent motor services which proved its salvation on a recent occasion. The drivers of the railway vehicles being members of the railwaymen's union would strike with their friends, and they would be careful not to allow their vehicles to be handled by volunteers. Supposing the emergency took the form of a European war, our forces would have to be mainly dependent on vehicles commandeered from the railways. Probably these vehicles would by that time have come to be an essential part of the railway system, so that military transport could only be created at the expense of the serious dislocation of transport at home. Moreover the railways as large users of coal would probably tend more and more to adopt either steam or electric vehicles for all the services in which these could possibly be used. In the last war it was shown that the steam vehicle is of very limited utility and the electric vehicle of no military utility at all. The latter must, of course, operate within a limited radius of its base at which recharging facilities must always be available. The steam vehicle requires supplies of solid fuel and of water. Unless the latter is obtainable

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of decent quality almost everywhere, the service will either break down or become unreliable. Moreover, the majority of steam vehicles emit smoke or vapour, which would enable them to be located by an enemy. It is therefore essential to national security that large numbers of heavy internal combustion vehicles should be in civilian service at normal times. Any scheme which might tend to eliminate them by reason of the railways becoming transport monopolists would be attendant with grave danger to the community. Thus on the whole it does not appear desirable that they should receive unlimited powers in respect of the operation of road vehicles. At the same time it is not in the public interest that the powers should be so limited as to render impossible the prompt and satisfactory collection and delivery of goods which for any reasonable part of their journey are rail-borne.

CLEARING HOUSE ORGANISATION.

Unfortunately it does not seem possible at the present juncture to secure effective central control of the road transport clearing houses that are springing up in many quarters. With a view to organisation of this sort, a central association of road transport clearing houses was last year formed. This central body, in principle at least, secured the support of important organisations such as the Federation of British Industries, the Association of Chambers of Commerce, and others. Delegates of these bodies have attended meetings at which the desired organisation has been discussed. There are, however, many difficulties in the way. A proper scheme of co-ordination demands the existence in each centre of only one generally recognised clearing house. This should give no preferential treatment to any group of vehicle owners. It should be sound financially, and it should be worked on lines enabling it to be linked to the corresponding recognised clearing houses in other centres. So long as each clearing house has its own methods, its own scale of charges, and its own arrangements under which the members of some particular association of carriers or traders might receive preferential treatment, effective co-ordination is impossible. We regret that the result of recent deliberations is such as to lead to the conclusion that, for the present, it is impossible for the Central Association of Road Transport Clearing Houses to evolve an effective co-ordinating scheme. Whether the difficulties will gradually disappear or become more acute as time goes on, remains to be seen. For the moment one can only say that a very praiseworthy attempt has been brought to a standstill.

SPEED LIMITS.

The Committee of the Ministry of Transport, the majority of which must be held responsible for the present scheme of motor taxation, is now turning to the question of speed limits. We hope that its conclusions will be more reasonable from the standpoint of motor users, more intelligible, and favouring laws more easy to administer. In respect of private cars and of trade vehicles of like weight, the unofficial view is practically solid in favour of the abandonment of a speed limit. The question of whether a driver ought to be prosecuted should depend on whether he is a danger to the public. As to the heavier classes of vehicle, we are bound to admit that some speed limits must be imposed, for the combination of great weight and high speed is damaging to the present roads. Viewing the question from this standpoint, and recognising that greater speed makes for lower costs per ton mile, it is evident that legal speeds should be increased but that limits should be retained. These limits might best be based on the unladen weight of vehicles, because that weight has already been ascertained for purposes of taxation, and the question whether a vehicle comes into a certain category, and therefore whether it is or is not exceeding the limit, can thus be immediately determined without having to put the vehicle on the weighbridge, which would be necessary if axle weight or laden weight were made the basis on which speed limits are determined. Vehicles weighing not more than 3½ tons unladen might be allowed to travel at 20 miles an hour. For heavier vehicles up to, say, 5½ tons, the limit might be about 16 miles an hour. For the heaviest classes of all, speeds above 10 miles an hour would probably be undesirable. These suggestions presume the use of rubber tires. It is hardly likely that vehicles and tractors with metal tires will be permitted to travel above eight miles an hour. The drawing of trailers behind the lighter class of vehicle should be discouraged. In connection with the heavier classes, it might involve halving the legal speed otherwise permitted, though for the heaviest classes of all, if 10 miles an hour is the speed without a trailer, seven or eight miles an hour would be reasonable with a trailer on rubber tires.

AID FOR THE MOTOR TRADE.

Speaking at a dinner given by the Institution of Automobile Engineers on January 26, Mr. A. S. Mays-Smith, President of the Society of Motor Manufacturers and Traders, stated that the society were prepared to grant £2,000 to the Institution of Automobile Engineers for a period of years to bring about the supremacy of British manufacturers in the automobile trade. Unless they could get cheaper labour—not ill-paid labour, but well-paid labour, turning out full production—they would not be able to hold the British lead in the industry.

Suggestions by the Head of the Austin Company.

On January 25 a conference was held at the Connaught Rooms, London, to discuss the position of the motor industry. Sir Herbert Austin, M.P., of the Austin Motor Company, stated that the real difficulty was with the export markets, which, for various reasons, were largely closed. He thought they had reached the bottom of the depression, and that before long there would be a recovery. It was difficult to raise capital for the trade at present. He did not believe that the motor trade could hope to compete in the future with foreign countries who were favoured by the rate of exchange unless the manufacturers were able to spend a much larger sum on the equipment of their factories. The kind of competition English manufacturers had to face in foreign and colonial markets was not good for anybody. In some of the colonial and foreign ports there were thousands of foreign cars waiting to be sold by auction. If normal conditions could be restored, and if the public would finance companies which had shown that they could manufacture cars in an economical manner, they would not need to fear foreign competition. They could produce cars just as cheaply as Ford, but would first have to spend £25,000,000 in new equipment, and it would take three to five years to put it into operation. Competition from America would not be so keen as people anticipated, but there would be strong competition from Germany, France, Belgium, Italy, and other countries in the Dominion and South American markets. The Dominions should not be expected to give a preference to our goods of more than 8 or 10 per cent.

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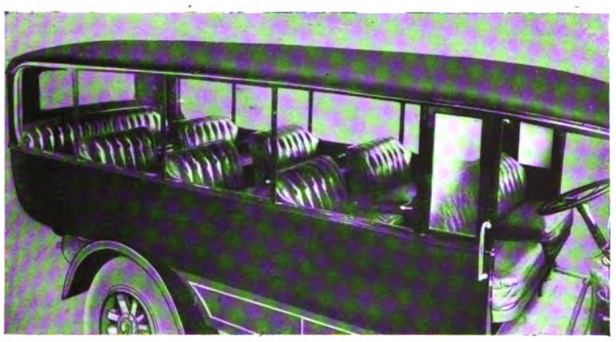
MOTOR TRAFFIC

SCOTTISH MOTOR EXHIBITION.

STEPS TO MEET THE FALLING PRICES.

The most prominent feature connected with this year's annual exhibition of motor vehicles in Scotland was to be seen in the matter of prices. Several manufacturers—notably the Associated Equipment Company and the Daimler Company—announced reductions in prices ranging from £100 to £300, but the majority did not adopt this course. The reason was that their prices are fixed on the costs of production. Prospective customers were offered a guarantee



Interior of Daimler Coach De Luxe Shown at Glasgow.

that if there should be any fall in prices during the manufacturing season they will refund anything between the prices that might obtain in July next, for instance, and those of to-day.

The exhibition was in the Kelvin Hall, Glasgow, and the exhibits comprised both private and commercial vehicles. The latter included the Albion, Alldays, A.E.C., Austin, Beardmore, Belsize, Berliet, Caledon, Chevrolet, Clyde, Commer, Daimler, De Dion, Delahaye, Dennis, Dodge, Fiat, Garner, Guy, Halley, Karrier, Leyland, Maudslay, Maxwell, Napoleon, Oldsmobile, Overland, Palladium, Selden, Star, Thornycroft, Tilling-Stevens, Vim, Vulcan, and Wallace companies.

Regarding the question of delivery, it is important to note that the long delays experienced last year do not now confront the would be operator of a new vehicle. For instance, the Associated Equipment Company announced that immediate delivery will be given of their 30-H.P. K-type single-deck saloon omnibus, which seats 30 passengers, and is sold complete at £1,950 net. Their de-luxe char-a-banc, seating 30 and the driver, is obtainable in April at £2,350; while the 4-ton tipping wagon at £1,550 can be delivered five weeks from date of order.

The Daimler Company showed a saloon coach de luxe, having pneumatic tires. A similar coach was exhibited with solid tires, and a third exhibit was a mechanically-operated tipping wagon. Each had the famed silent engine. C.A.V. electric lighting sets are fitted to each machine.

The Tilling-Stevens Motors, Limited, of Maidstone were well represented. This company staged four of their well-known vehicles, namely, a petrol-electric single-deck saloon omnibus, a petrol-electric fire engine and ladder, with dismountable pump, a 3-4 ton petrol-electric chassis, and a 2½-ton gear-driven chassis.

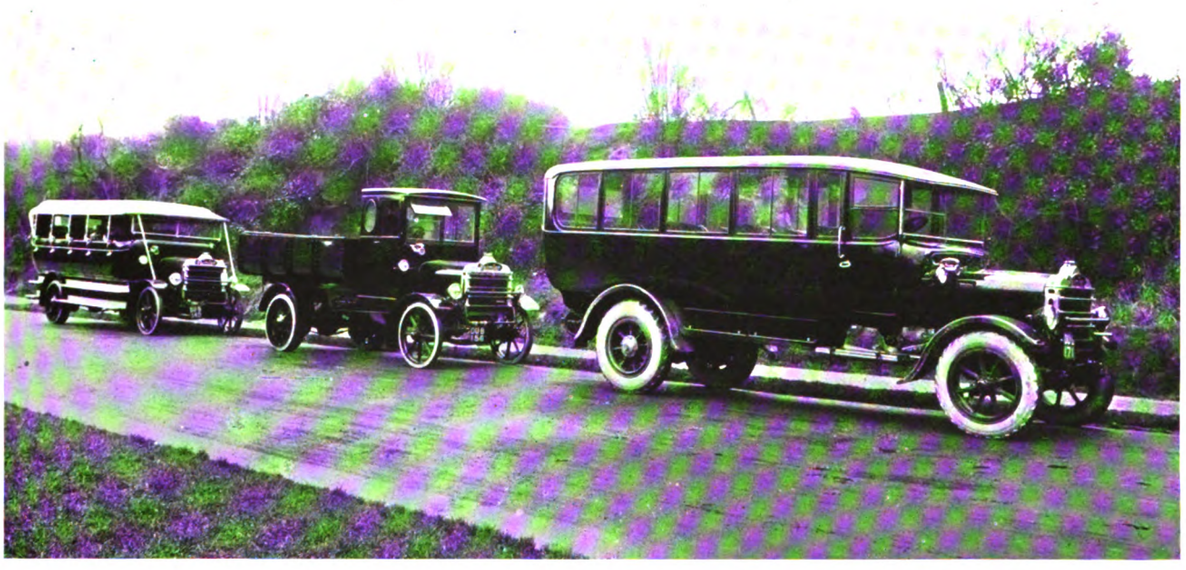
PREPARING FOR TRAFFIC BOARD.

THE PRICE OF MOTOR OMNIBUS MONOPOLY.

A report of the Parliamentary Committee of the Hertfordshire County Council suggests that the London General Omnibus Company are ready to give municipal authorities a "voice" in the matter of the services. Motor omnibus powers were sought by the County Councils of London, Middlesex, and Hertfordshire. In giving the decision of the House of Lords Committee, which threw out the three County Bills, Lord Wemyss, the chairman, said the committee wished it to be recorded that during the hearing the London County Council and the officials of what was called the "combine" had repeatedly expressed their desire to promote the co-ordination of the traffic of London. It was therefore hoped that pending the establishment of a Central Traffic Authority the combine and the London County Council would co-operate, and that the companies would help the tramways by trying to provide increased omnibus services to suit the requirements of the tramways where those might prove to be necessary.

The Parliamentary Committee proceeds to state that though all three County Councils failed to obtain powers to run omnibuses, the fact that the Hertfordshire County Council showed that they also were prepared to ask for powers appears to have made a great impression on the London General Omnibus Company, which are now augmenting their services in the county to a large extent, and it is understood that the company are prepared to develop the services further at an early date, and to enter into an arrangement with the Hertfordshire County Council giving that Council some voice in the omnibus service in the county.

The costs of the Hertfordshire County Council in connection with the Parliamentary proceedings in connection with omnibus services, amounted to £3,531.



Scottish Show Exhibits of the Daimler Motor Company.

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MOTOR TRAFFIC

RAILWAY GOODS BY ROAD.

INQUIRY BY THE MINISTRY OF TRANSPORT.

On January 26 the Minister of Transport announced that he had appointed from the advisory panel, established under the Ministry of Transport Act, 1919, a Committee to advise him upon the running by railway companies of road services for goods traffic. The terms of reference are—To inquire and report whether it is desirable that railway companies should have general or limited power to carry goods by road, and if so, what, if any, conditions should be attached to the exercise of this power.

The members of the Committee are—

Mr. J. H. Balfour Browne, K.C. (*Chairman*).

Mr. C. Aldington, general manager, Great Western Railway Company.

Mr. H. Carrington, transport manager to the Sheepbridge Coal and Iron Company, Federation of British Industries

Mr. G. A. Dutfield, president of the National Alliance of Commercial Road Transport Associations and Federations.

Mr. J. J. Hughes, traffic manager of Peek, Frean and Company, Association of British Chambers of Commerce.

Mr. E. S. Shrapnell-Smith, chairman of the National Council of the Commercial Motor Users' Association and of the Standing Joint Committee of Mechanical Road Transport Associations.

Mr. B. Smith, national organising secretary to the United Vehicle Workers and member of the executive of the National Transport Workers' Federation.

Mr. J. H. Thomas, M.P., Parliamentary general secretary, National Union of Railwaymen.

Mr. A. Watson, general manager, Lancashire and Yorkshire, and London and North Western Railway Companies.

Mr. S. J. Muir Smith, Ministry of Transport, Horse Guards Avenue, S.W.1 (*secretary*).

TRAFFIC ROUTES IN REGIONAL PLANNING.

As the result of conferences with representatives of all the local authorities surrounding Manchester, a joint committee for town planning has been set up. Out of 114 local authorities who were asked to join the committee, 72 have appointed representatives. At a meeting of the committee on January 14 Mr. G. L. Pepler, chief town planning inspector to the Ministry of Health, said that the region was approximately equal in size to Greater London. He suggested that one of the first duties should be to arrange for a survey of the whole region, so that any conclusions arrived at might be based on ascertained facts. He referred to the civic survey of Sheffield and the traffic report of the Manchester Tramways manager (Mr. J. M. McElroy), from which helpful information could be derived. At the moment expenditure on public works had to be curtailed; but it was the golden opportunity to prepare plans, and by town planning schemes fix and reserve the sites for traffic routes and other public services and amenities, so that when the present financial crisis had passed the development of such an important region could proceed on economical, efficient, and beneficial lines, and in the best interest of the whole community.

AN ANTI-DAZZLE LAMP.

The Royal Automobile Club have recently tested an anti-dazzle lamp invented by Sir H. Grubb, astronomical instrument maker and inventor of the submarine periscope. The report of the test states that the desired effect has been obtained by the arrangement of two lenses, and that a pedestrian can be seen by the driver at a distance of 135 feet. The device will be tested by the Departmental Committee.

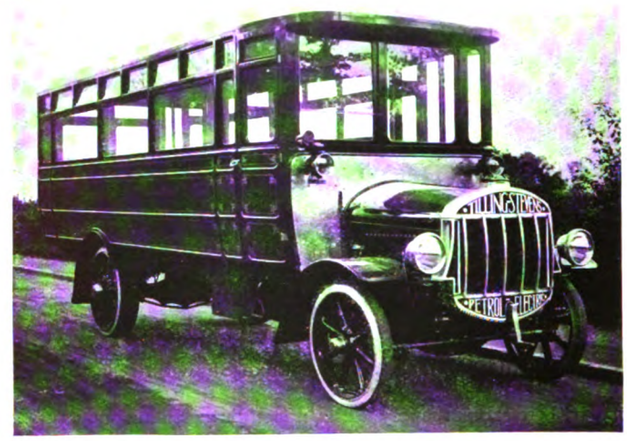
STEAM WAGON ECONOMY.—In the course of a speech on the cleansing work of Leicester, Mr. T. W. Walker, a member of the Corporation, stated that a 5-ton steam wagon was doing splendid work, and was saving five guineas a week after its expenses had been paid.

THE NEXT EXHIBITION.—This year the exhibition of private motor cars will be held at Olympia on November 4-12, following the Paris show in October. In December an exhibition will take place at Brussels.

MAUDSLAY OMNIBUSES FOR COVENTRY.

AN ORDER FROM THE TRAMWAYS DEPARTMENT.

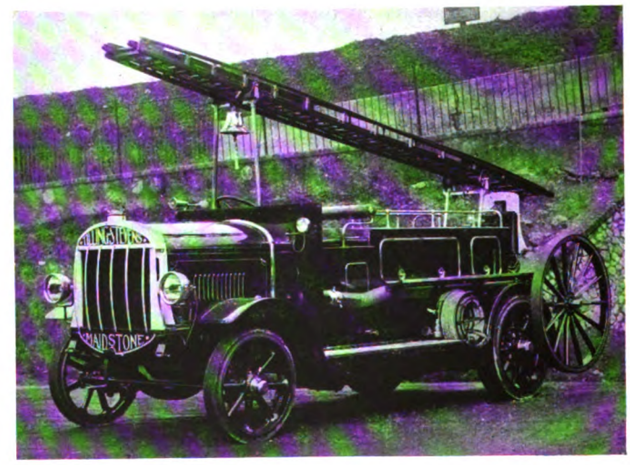
The first of a number of single-deck omnibuses have been delivered to the Coventry Corporation tramways department by the Maudslay Motor Company. As will be seen from our illustration, these vehicles are of a most pleasing appearance. They embody a number of features in their construction which can be regarded as a notable advance upon the older method of body building. Constructed to



Tilling-Stevens' Petrol-Electric Exhibit at Glasgow.

seat thirty-six passengers, the seats are so arranged that the loaded weight is distributed in such a manner that the camber of the road is entirely neutralised. Moreover, by means of the special form of construction the total weight of the body has been reduced by several hundredweights, while greater rigidity has been secured. A noteworthy feature in the design of the body is the wide rear entrance, which greatly facilitates the loading and unloading in rush hours. The bodies are being built by the General Seating Company under the "Hickman" patents.

The chassis is the Maudslay "J" type, fitted with a 40-H.P. engine with overhead valves, a special feature of which is its remark-



Tilling-Stevens' Fire Engine, Escape, and Detachable Pump.

able accessibility. Although the cylinders are cast in pairs, the water jackets are connected and of large area. The crank case is suspended on a special rolled steel sub-frame, and by means of large inspection doors the pistons and connecting rods can be taken out without disturbing the cylinders. In order to permit the removal of the valves and their casing, it is only necessary to remove the nuts which hold down the camshaft casing on the near side of the cylinder head, when the casing with the camshaft still in position

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can be swung over to the opposite side. The valve boxes, complete with the valves and springs, can then be removed. The cooling water circulation is maintained by a centrifugal pump, the induction pipe of the Zenith carburetter being fitted with a water jacket. The frame of the chassis is of very rigid construction, the engine and gear box being carried by a sub-frame. Transmission from the engine to the four-speed gear box is by the clutch shaft with universal joints, the final drive being by overhead worm. The Maudslay banjo steel forging is incorporated in the back axle, which is a particularly accessible unit. Inspection of the main spur gearing can be made by merely removing the bottom half of the axle centre, whilst the whole of the axle and differential gearing can be lifted from the axle forging complete in its housing by removing the hub caps and withdrawing the axle shafts. Ample brake power is provided. The wheel base is 15 ft. 6 in.

OMNIBUS WORKERS' DEMAND.

In connection with the refusal to entertain the demand of their employees for an extra 12s. per week, it has been pointed out by the London General Omnibus Company that before the war there were 10,101 drivers in their service, and this number had been increased by nearly a thousand consequent upon the introduction of the eight-hour day and the development of traffic facilities. The drivers, who in 1914 received £2 12s. 6d. a week, now earn £4 18s. 6d., while the wages of conductors have risen from £1 19s. to £4 6s. 6d. Owing to the growth of the wages bill, and the heavy new taxation, the company cannot accede to the demand of the men for an extra 12s. Under the new scheme of licence duties on motor vehicles, which came into effect on January 1, the London omnibus paid £84 a year, and the London General Omnibus Company and its associates, as prospective owners of a fleet of about 3,000 omnibuses, would have to find about £250,000. Omnibus and tramway fares had recently been increased, and if further demands are made upon the public, the companies fear that a great reduction of traffic would result.

THE NEW ROAD SIGNS.—Regarding the suggestions of the Ministry of Transport in the way of road direction posts, danger signals, and village name signs, the County Councils Association has urged that in the interests of uniformity there should be definite statutory provision constituting the County Councils the sole authorities in these matters, and also making the erection of colourable imitations thereof by any body or individual a punishable offence.

LONDON OMNIBUS FARES.

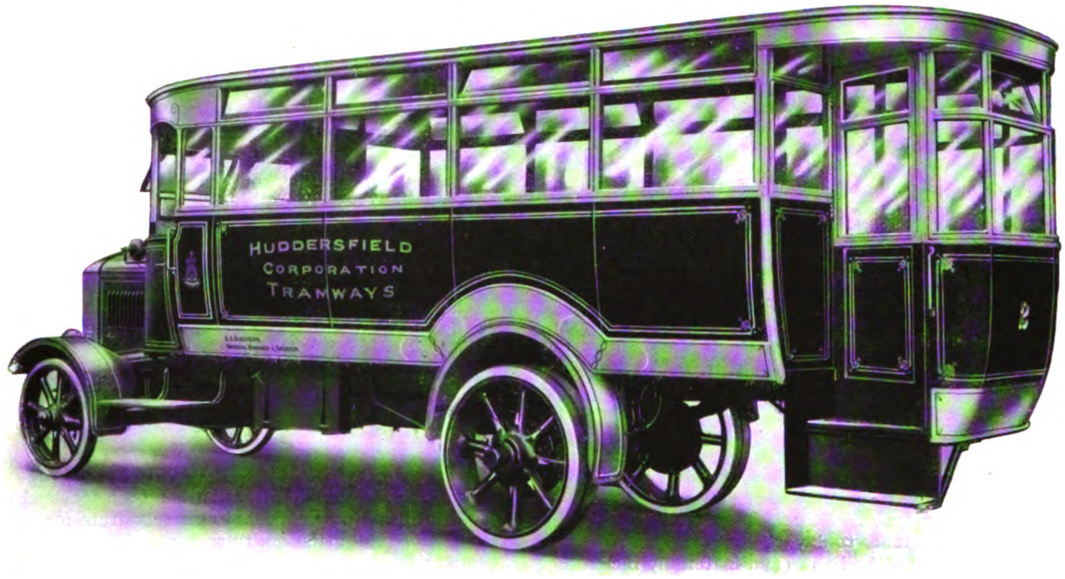
STAGES REINTRODUCED ON AN ALL-NIGHT SERVICE.

In the four months which have elapsed since the fares on the motor omnibus routes of the London General Omnibus Company were revised complaints in only 40 cases have been received, although more than 12,000 fares were involved in the alteration.

The case of every single fare which has been made the subject of complaint has been investigated carefully, and the reports and suggestions of the company's servants, based upon daily observation of the passengers' requirements, have been examined. As a result, five alterations in fares or fare-points, affecting 37 different fares in all, have been carried out to meet reasonable representations on the part of the public.

In order to popularise the all-night omnibus services Nos. 94 and 94a, operating between Cricklewood and Willesden respectively, and Liverpool Street (Central London tube station), important alterations both as regards fares and times have been made.

The former maximum fare of 3d. has been abandoned, and 1½d. and 2d. stages introduced. The services will work in alternation. No. 49a will leave Willesden at 11 p.m., 1.36 a.m., and 3.37 a.m., returning from Liverpool Street at 11.56 p.m., 2 32 a.m., and 4.33 a.m., and No. 94 will leave Cricklewood at 12.44 a.m., 2.44 a.m., and 4.38 a.m., returning from Liverpool Street at 1.32 a.m., 3.32 a.m., and 5.26 a.m.



View of Rear Entrance of a Huddersfield Corporation Tramways Omnibus with a "Karrier" Chassis.

MOTOR FUEL RESEARCH.

The following promises of financial support were reported at the last meeting of the Empire Motor Fuels Committee (50 Pall Mall, S.W.1), the respective contributions having been promised annually for two years in each case—C.M.U.A., £500; R.A.C., £500; Car and General Insurance Corporation, £100.

The Chairman of the Research Association of British Motor and Allied Manufacturers, Mr. H. C. B. Underdown, wrote that the subject of motor fuel research was so wide, affecting as it did not only the motor industry but other industries, that they did not feel justified at present in taking the matter up. The subject was so vast that to be done properly would entail an expenditure far beyond the total income of the association, which income has been allocated to three or four definite subjects of technical interest to the industry.

This attitude was noted with regret, having regard to the importance of fuel research to the motor industry, and it was decided to take steps to approach the Society of Motor Manufacturers and Traders for support.

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REPORT ON MOTOR FUEL.

RECOMMENDATION IN FAVOUR OF GOVERNMENT CONTROL.

On January 31, 1921, the Board of Trade issued the second and final report of the Sub-committee appointed to investigate motor fuel prices by the Standing Committee under the Profiteering Acts. At the outset the Committee remarked—

In considering the dependence of this country on American supplies, it is pertinent to note that in the year 1919 we imported 80 million gallons of petrol, i.e., 40 per cent. of our total supplies, from the United States. This quantity constitutes only 2½ per cent. of the 3,298,000,000 gallons produced in the United States in 1919, and could thus be easily absorbed by America for home consumption. In order properly to understand the petroleum position, the effect of the war upon this industry must be taken into account. For a period of nearly six years the development of fresh sources of supply, and indeed the extension of existing sources, was almost at a standstill. As a result, America (which is the largest producer and exporter of petroleum products) cannot be relied upon to meet our future requirements unless there is a considerable increase in production. In the year 1919 the United States produced thirteen thousand million imperial gallons, and as their consumption exceeded this figure, they were importing certain grades from Mexico for domestic use. The United States are in fact to-day a nation importing petroleum for its own needs. This view is confirmed by the report of the Federal Trade Commission. The oil industry in several producing countries was almost completely destroyed, as for example, in Russia and Roumania, with the net result that the rate of increase in the world production of oil has been very seriously checked. On the other hand, the effect of the war upon consumption has been in these six years to extend the use of internal combustion engines to a degree which would normally have taken at least fifteen or twenty years to accomplish.

PETROL.

We have carefully considered the recent rise of 7d. a gallon in the price of petrol, and in view of the conditions which we have found to govern the oil trade as mentioned in our previous report, it is obvious that there can be no possible justification—based on cost of production—for such an increase. It is significant that petrol (gasoline), approximately equal to our No. 3 spirit, was at the time of the increase being sold retail in the United States at a price equivalent to 2s. 2d. per imperial gallon (at the then current rate of exchange), which figure includes all the costs of distribution and all profits. We venture to hope that the drop in price of 3d. per gallon which took place on October 11 shows that the petroleum companies are now beginning to be alive to the objections of maintaining the present high prices.

Taking the position as it stands to-day, the only hope of reducing prices seems, as already stated, to lie in (1) a materially increasing volume of supply; (2) the introduction of substitutes; and (3) a reduction in the consumption by the adoption or substitution of other methods of obtaining power.

BENZOLE.

The importance of benzole was not fully appreciated until the stringency of war conditions compelled us to obtain a maximum quantity for explosives. The production in this country during that period for war purposes reached as high a figure as 42 million gallons per annum. Since the Armistice many of the gas companies have discontinued the practice of scrubbing for benzole, and the output from this source has fallen very considerably. To obtain any substantial increase in the production of benzole it will be necessary in some cases for gas companies to erect new plant. This, probably, they will now be willing to do, as they have been enabled to fix their own gas standard and charge according to the calories delivered. It is estimated that if the necessary plant is erected it would be possible to extract from 1½ to 2 gallons of refined motor spirit per ton of coal carbonised. This would mean in the case of the Gas Light and Coke Company, Limited, an extra 4 million gallons of benzole per annum, and a production from existing gas companies alone of about 35 million gallons as compared with the present production of between one and two million gallons. A consideration of the Accountant's Report on the cost of production and refining shows that benzole could be retailed in this country at a price considerably lower than the ruling prices for petrol and still yield a high rate of profit. That this fact is generally appreciated is evident from the successful flotation during the last nine months of several new companies to deal with benzole and other by-products of coal. The books of six firms manufacturing crude benzole were examined with an aggregate total production over the six months ending March 30, 1920, of 1,771,615 gallons. The average cost per gallon of these 1,771,615 gallons was 10·125d. The average cost of refining one gallon of motor benzole, after crediting the market value of the residuals and making due allowance for the loss in the volume of crude, was 4·55d. per gallon.

It is a fairly obvious conclusion that if America decides largely to curtail her supplies of motor spirit to this country, the various existing distributing organisations who now depend on America for their supplies will, in the endeavour to cut losses which would result from such diminution of their business, attempt to obtain control of the benzole industry. Their more effective organisations and the capital at their disposal would enable them to offer a higher price for the crude benzole than the British benzole refiners could afford to pay, and still retail the refined spirit at a lower figure. We would urge that some action mutually agreeable to His Majesty's Government, the consumer, and to the benzole industry should be arrived at. We are of opinion, however, that whatever arrangement is finally made, it would be found necessary to fix a legally enforceable maximum price for benzole at all stages of production. In so doing, due regard must be had to the varying qualities of benzole.

BRITISH PETROLEUM.

Eleven prospecting borings have been commenced in Great Britain, seven of which are in Derbyshire, two in North Staffordshire and two in Scotland. In one of these oil has been found, one at Ridgway has been abandoned, and the rest—in several of which there are indications of oil—are under way. At Hardstoft, Derbyshire, oil was discovered in May, 1919, and has continued to flow over the top ever since, at practically the same rate. A barrel of oil of this character yields about 2½ gallons of commercial motor spirit; it would therefore be necessary to produce 100,000,000 barrels annually to satisfy the present petrol requirements of the United Kingdom. It is highly improbable that Great Britain will ever produce this quantity of crude petroleum.

SHALE OIL.

Shale oil was first developed as a commercial undertaking in Scotland. This industry commenced business in 1878, and has continuously mined approximately 3,000,000 tons of shale per annum, yielding some 60,000,000 gallons of crude, out of which approximately 5,000,000 gallons of motor spirit are obtained. Shale oil contains very definite possibilities as a source of power and is a fruitful field for development, both in this country and in other parts of the Empire.

POWER ALCOHOL.

As considerable public attention has been focussed on the possibility of utilising power alcohol as a substitute for petrol, we have given very careful attention to such possibility. The difficulties of raw material and labour would seem to suggest that power alcohol can only be commercially produced in a tropical or semi-tropical area, where there is an ample acreage capable of producing good crops, a suitable supply of water and labour, and so situated as to involve minimum transport. We are, however, convinced that despite these difficulties, it is possible in certain parts of the Empire to produce power alcohol at a price considerably lower than the price ruling for petrol. We are informed by one company that they are commencing the production of power alcohol on a commercial basis and that the plant will be capable of very extensive production. No immediate relief can be expected from this fuel, and some two or three years must elapse before alcohol can be expected in any considerable quantity.

TRANSPORT AND DISTRIBUTION.

Tank Steamers.—We have caused an investigation to be conducted of the books of three of the principal importing companies, over a representative pre-war period and the latest accounting period. It would seem that the companies, when they explained the increased cost of petrol as being largely occasioned by the enormously increased cost of transport, were allowing the committee to assume that the increase actually paid was 8·2 pence per gallon, whereas in effect it was in respect of the companies under review an increase of only 2·52 pence per gallon.

Domestic Distribution of Petrol.—We decided to investigate the subject anew by means of a special cost accountancy investigation. From this report it will be seen that the accountant has ascertained the cost to be, approximately, 7½d. per gallon, as compared with the Pool Board figure of 6·19d. The practice of bulk distribution is very rapidly growing, and the wholesale distributing companies

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allow the retailer a reduced price of 1½d. per gallon when cans are dispensed with. We consider that the consumer should share in this reduction.

GENERAL.

The problem may be divided under two heads—the high price of various petroleum products, and alternative fuels and other sources of power.

Prices.—With regard to the question of prices, we have little to add to our previous report, and any general statement applies almost equally to petrol, paraffin, and fuel oils. The first and most important fact is that the prices of petroleum products are controlled by powerful combinations, whose financial resources are enormous and the scope of whose operations is world wide. These combinations own the principal sources of supply, and their possession of the bulk of the distributive machinery renders effective competition impossible. Their possession of tank steamers so obscures the position, that an entirely false impression is created as to the actual cost of freight.

Competitive private enterprise is unable to set any effective check on the power of these combinations, and nothing less than Governmental action can affect this alarming situation. It is admitted that, as regards petroleum products, the British Government could not on its own initiative effectively fix prices on the basis of the cost of production without incurring the danger of supplies being diverted. It could, however, control freight, and fix fair distribution and other charges in this country.

RECOMMENDATIONS.

When considering alternative fuels, such as benzole and power alcohol, it must be realised that any such substitution will necessarily fail to reduce the price of liquid fuels unless it includes transport and distribution under some effective form of Government control. We have little doubt that the petroleum companies are very seriously considering the production of power alcohol and other alternatives, but the consumer in this country will never reap the benefit of any reduction in price if the Government allows the factors which control the petroleum industry to dominate the alternative forms of liquid fuels.

After very long and careful consideration of the subject in all its aspects, we have reluctantly come to the conclusion that the only two ways of overcoming the present difficulties are—

(1) Combined action amongst the consuming countries of the world through the economic section of the League of Nations.

(2) The production of substitutes and the adoption of alternative sources of power to such an extent that the supply will reduce prices to a reasonable level. It is essential that the production and distribution of substitutes should not be controlled by monopolists.

Although, in general, we dislike Government control of industry, we see little chance of success unless action is taken by His Majesty's Government to foster and firmly establish on a lasting basis the manufacture of substitutes in large quantities. Actual and healthy competition so constituted will tend to force down the retail prices of all fuels to a figure which bears a fair relation to the cost of production.

Coal is a great national asset, and it would therefore seem that the soundest policy is to make use of such treatment of coal, shale, and analogous materials as will give to the United Kingdom an ample supply of power derived from coal products in either the solid, liquid, or gaseous state. New legislation should also be introduced to prevent, as far as is possible, the consumption of coal in its raw state before the by-products have been extracted. If proper use were made of coal it would once and for all free the nation from the necessity of importing liquid fuel at any price which it may suit the outside producer to charge for it.

(Signed) †WILFRID STOKES (*Chairman*), *J. C. CLARKE, FRANK CHITHAM, †PETER GILLESPIE, †HERBERT F. MANISTY, †S. MARCH, †ROBERT H. MONTGOMERY, PERCY STILL, P. G. L. WEBB, W. WOLSEY.

†These members, while in agreement with the above report, consider that there is little chance of benefit to the consumer unless His Majesty's Government exercise some executive control over the manufacture and distribution of substitutes.

*Mr. Clarke is opposed to any Government action and considers that the present position is due not to monopoly, but to a temporary shortage of fuel and of the means of transport, the cost of which must be regulated by the world market.

The cost of the two reports was £950, of which £41 represented the cost of printing and publishing.

NATIONAL BENZOLE REDUCED.

The National Benzole Company have issued a circular in which they state that while the abolition of the duty on imported motor spirit enables petrol distributing companies to reduce the price of petrol by the amount of the tax without any loss to themselves, such a reduction is not possible in the case of National benzole. In fact, if the price is lowered at all it would result in an actual loss to the producers. The company, however, are prepared to make a sacrifice in order to maintain their trade, which they consider is of vital importance to the country. Although the prevailing high cost of production does not permit of a reduction in price equal to the tax which has been withdrawn from petrol, if the present standard of National benzole quality is to be maintained, they desire always to offer the public a decided advantage on an efficiency basis over any other motor spirit, and they have therefore decided to reduce the price of National benzole by 3d. per gallon as from January 1.

Leeds Corporation are selling benzole from their gasworks at the following prices—To private consumers, 2-gallon tins, 3s. 1d. per gallon; 40 gallons and upwards, 2s. 11d. To garages and in cases where the benzole is for re-sale, 2-gallon tins 2s. 11d. per gallon; 40 gallons and upwards, 2s. 9d.

OMNIBUS COMPETITION IN KENT.

At the annual meeting of the East Kent Road Car Company, held at Canterbury on January 13, the directors' report stated that after deducting all items chargeable to revenue, including depreciation, there is a profit on the year's working of £14,440, to which has to be added the balance from the previous year, together with the unabsorbed balance of an excess profit duty suspense account, amounting to £5,336. This made a total of £19,776. £1,000 of this sum had been allocated to general reserve, and a dividend at the rate of 10 per cent. per annum was to be paid, amounting to £11,755, leaving a balance to be carried of £7,021. The undertaking had suffered from unseasonable weather during the holiday period, and also from the high cost of petrol.

The Chairman (Mr. S. E. Garcke), in moving the adoption of the report and accounts, stated that on public demand a new and more open type of body had been introduced into the company's services, and this summer the idea would be extended. He complained that the orthodox omnibus undertakings had to meet an unfair and irregular competition from those who merely put their vehicles on the road during the peak hours of the best days of the year, leaving the other undertakings to provide a service which, for a large part of the year, must run at a loss.

SCOTTISH MOTOR TRACTION COMPANY.

In their annual report for the year ended September 30 last, the directors state that the net profit for the year, after making adequate provision for the company's liability under the Finance Acts, and after allowing for depreciation, amounts to £26,998, to which is added the balance from last year, making £31,756. There has been again a substantial increase in the passenger traffic, but the operating expenses have been much heavier during the past year.

With regard to the Bill promoted by the Edinburgh Corporation for the extension of the city boundaries and the running of motor omnibuses outside the extended area, satisfactory terms were arranged between the directors and the Corporation before the Bill came before the Parliamentary Committee.

The sum of £24,899 has been added to the value of the heritable properties held by the company, which has also purchased the assets of the Dundee and District Mechanical Transport Company. The directors intend to increase the services largely. The number of omnibuses in operation at the end of the season was ninety as against fifty-four at the close of the previous year.

DEATH OF MR. GEORGE H. HALLEY.—The motor industry learned with regret on January 9 of the death of Mr. George H. Halley, managing director of Halley's Industrial Motors, Limited. Mr. Halley founded the firm in 1901, and through his energy and organising ability the business was repeatedly enlarged, and eventually transferred to the present extensive works at Yoker. A distinguishing feature of the firm was the cordial relations with the staff and workmen, who regard their loss as irreparable.

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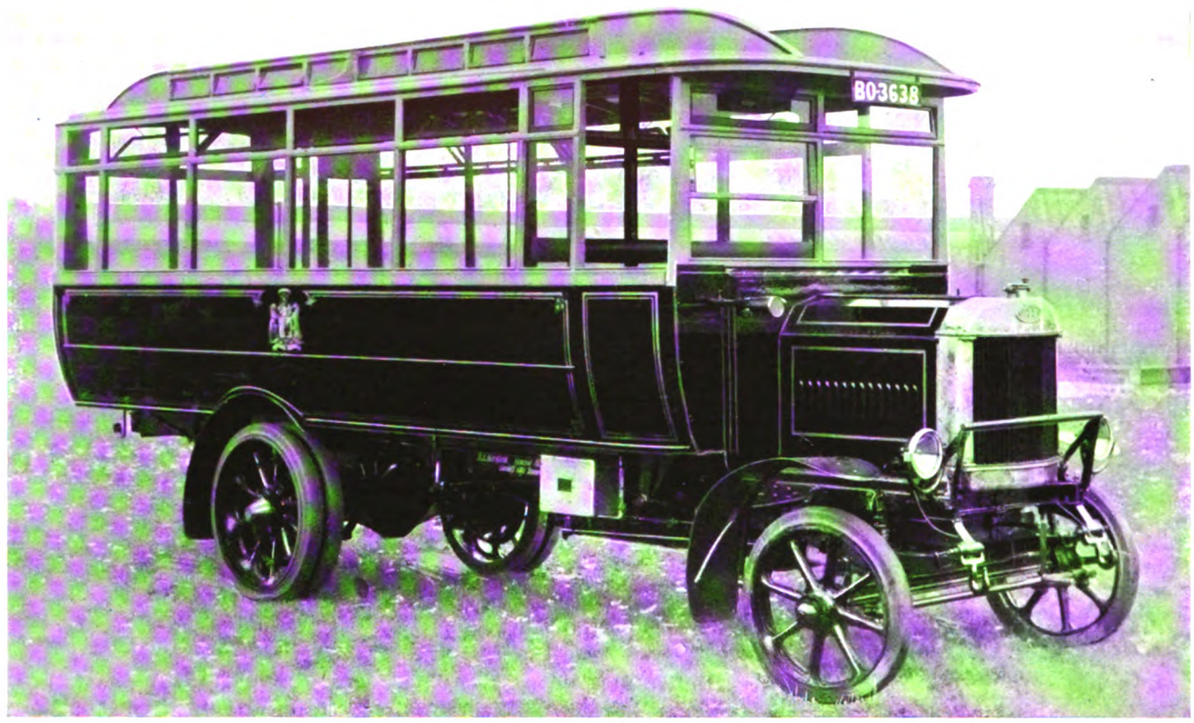
STEVENS' PETROL-ELECTRIC OMNIBUSES.

SIX ORDERED FOR CARDIFF TRAMWAYS DEPARTMENT.

On this page is a photograph of a single-deck omnibus, being one of six supplied to the Cardiff City Tramways. The chassis, supplied by Stevens Petrol-Electric Vehicles, Limited, 82 Victoria Street, London, S.W.1, is their "A" type 3-4 ton petrol-electric, details of which have already been given in these pages.

The body is by Messrs. Christopher Dodson, Limited, of Willesden and Westminster, who specialise upon the construction of omnibus bodies entirely. It is of their well-known C.D.19 type, which body they have standardised, and are producing in large quantities. A special feature is the clerestory roof, which, in conjunction with the top side ventilators, affords ample ventilation, even in the hottest weather, and in addition gives much greater headroom as compared with the usual plain roof omnibuses.



One of Six Stevens' Petrol-Electric Omnibuses for Cardiff Corporation Tramways.

An interesting feature of this body is the method of insulating the front part of the body, screen and front doors from the racking entailed by the vibration and working of the dash. When on a rough road, it is interesting to observe the relative movement between the dash and the screen, showing that the screen is relieved of very great and undue straining. The wind doors, too, remain quiet, and undue wear of the locks and hinges is obviated.

The interior seats are of a very comfortable design; all the cushions are made up on spring frames and trimmed in real leather. The seating capacity is twenty-six inside, and there is room for two or three beside the driver. Painted in the Corporation's standard colour, the omnibus certainly has a very fine appearance.

THE KING AND MOTOR PARADE.—For the annual parade of commercial motor vehicles, organised by the Commercial Motor Users' Association, to be held in London on Saturday afternoon, April 2, the first entries have been received from Anglo-American Oil Company, Beck and Pollitzer, Gas Light and Coke Company, E. Nelson and Company, and Westminster City Council. Full particulars of the parade, which is being held under the patronage of His Majesty the King, may be obtained on application to the Secretary, 50, Pall Mall, London, S.W.1.

UNITED AUTOMOBILE SERVICES, LIMITED.

A SUCCESSFUL UNDERTAKING.

In their report for 1920 the directors of the United Automobile Services, Limited, report a substantial profit, after laying aside the most ample reserves for depreciation and other contingencies. In recommending payment of a dividend at the rate of 15 per cent. per annum, the directors state that the company has made great strides in every section of its business, and has consolidated and improved its position considerably during the year. Over 500 miles of route are operated, the potential traffic of which has as yet only been touched. Notwithstanding general depression in trade, the company's business is showing a substantial increase in receipts over last year, and there is an insistent demand for more omnibuses and extension of routes in certain of the districts. The requirements of the public will be met as soon as additional vehicles can be placed in service. The wisdom of the policy adopted of running the majority of the omnibuses in the coal mining areas, where the population is large and prosperous, is becoming more and more apparent, while the company are enabled during the summer to get remunerative holiday traffic on their East Anglian routes. A substantial profit, it is stated, accrued from the sales and profit department. The net profit for the year amounted to £16,725.

SOUTHWARK BRIDGE AND OMNIBUS TRAFFIC.—The Works Committee of Southwark Borough Council have recommended the Council to make no observations on an application from the London General Omnibus Company for permission to run omnibuses over the new Southwark Bridge, Southwark Bridge Road, and Southwark Street to Blackfriars.

LEYLAND INSTRUCTION BOOK.—Leyland Motors, Limited (Leyland, Lancs.), have just issued a new instruction book, which gives information in a handy form as to the care and working of the Leyland petrol motor chassis. With the book is issued free the pamphlet of the Commercial Motor Users' Association, explaining the police regulations regarding commercial motor vehicles. A copy of the book will be supplied to any Leyland user.

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MOTOR TRAFFIC

OMNIBUS SERVICES.

BLACKPOOL.—The tramways department have instituted an omnibus service from Cleveleys to Thornton.

BOLTON.—The Corporation have granted licences for the running of four omnibuses by the Ribble Motor Services, Limited.

BOLTON.—The Watch Committee have granted licences for four omnibuses on a service between Bolton and Chorley by the Ribble Motor Services, Limited.

LINCOLN.—A report of the Lincoln City Council mentions that the three motor omnibuses are giving satisfaction, and that there are still eight omnibuses to be delivered.

GLAMORGAN.—The County Council have decided to grant applications for omnibus services in various country districts on condition that the omnibuses run to scheduled times.

DURHAM.—Local authorities in the county are being asked to support the tramways and omnibus scheme prepared by the County Council, and which is said to involve a cost of £1,641,393.

EDINBURGH.—Complaints having been made of the vibration of omnibuses when running on stone setts, Mr. Pilcher, the tramways manager, has decided to experiment with pneumatic tires in the near future.

YORK.—The Tramways Committee have authorised the engineer to obtain a Dorman engine and fit it to a chassis he has in hand to enable him to increase the omnibus facilities to the Leeman Road district.

PLYMOUTH.—The Corporation have made arrangements for the temporary use of part of premises at the rear of Salisbury Road for accommodating the new Corporation omnibuses at a rental of £2 10s. a week, including the use of the petrol storage tank.

AYRSHIRE.—The County Council have given permission to the Scottish General Transport Company, Limited, to run omnibuses on routes where the roads have a width of not less than 16 feet, and on condition that the proposed fares are submitted to the Council for confirmation.

SHEFFIELD-WORKSOP.—Worksop Urban Council report receipt of a communication from the Sheffield Corporation to the effect that it is proposed to commence an omnibus service between Sheffield and Worksop early in the year "providing the Corporation are relieved of the payment of the road tax."

LONDON.—Heston and Isleworth Urban District Council have been notified by the London General Omnibus Company of their intention to open up a service between Hounslow and Southall in connection with a scheme now under consideration for extending the services in the outlying portions of Middlesex.

ABERDEEN.—The Tramways Committee have ordered nine Thornycroft chassis for the purpose of augmenting the tramways service and engaging in tourist traffic. One omnibus, accommodating 30 passengers seated in a single-deck saloon, was used for touring last summer, and in January of this year it was put into service with three other single-deck omnibuses to and from Footdee, near the docks. Delivery of the remaining five vehicles is expected in May, two being fitted with coach bodies.

SOUTH SHIELDS.—The Watch Committee have further considered an application from the Northern General Transport Company, Limited, of Gateshead, to institute a regular service of omnibuses between South Shields, Harton, and Sunderland. The company asked for permission to open forthwith a portion of the proposed service routes within South Shields, and the committee have decided to grant licences for a reasonable number of omnibuses provided a certain route is adhered to, with such stopping places as may be approved by the chief constable.

DUNDEE.—At the end of January an omnibus service was started between the city and Inchture, a distance of about twelve miles. For the full distance the fare is 1s. 2d. The service will link an important agricultural district with the city. Seven journeys daily are made on weekdays and four on Sundays. It is operated by the Mechanical Transport Service, which is the Northern Branch of the Scottish Motor Transport Company, Limited. Dundee Corporation hope to begin their motor omnibus and coach service in May. The Council have accepted the offer of Mr. W. L. Lindsay for two complete omnibus bodies at £680 each, two coach bodies at £580 each, and four Thornycroft chassis at £1,134 each.

BRIDLINGTON.—The Highways Committee of the Corporation have considered the advisability of providing motor omnibuses as authorised by the Corporation Act, 1920, and also interviewed Mr. R. Williamson, the proprietor of the omnibus plying for hire in the borough. Mr. Williamson told the committee he was willing to continue to run his vehicle, and, if necessary, purchase and run another upon the following conditions—To collaborate with the Council in all matters relating to the running of omnibuses by him in the borough, and to submit time tables and lists of fares for approval The committee have recommended the Corporation to defer for the present the question of running omnibuses as authorised by their Act, subject to Mr. Williamson providing an omnibus service to the reasonable satisfaction of the Corporation.

PERTH.—The Tilling-Steven demonstration omnibus on January 13 gave great satisfaction to the members of the Perth Tramways Committee, who were accompanied by the Lord Provost and Mr. Snell, the tramways manager. Mr. Stanley Kennedy, technical representative of the Tilling-Stevens Motors, Limited, of Maidstone, and 26 Victoria Street, S.W., explained the features of the petrol-electric propulsion, and the driver at suitable points proved the accuracy of Mr. Kennedy's statement. The vehicle is a single-deck one, holding 32 seated passengers. It has doors at each end, and is divided into two compartments to allow of smoking. The passengers remarked upon the absence of shocks in starting and stopping, and were impressed by the ease of control and the safeguard against running away backward downhill. Tilling-Stevens omnibuses are largely used by the Scottish Motor Traction Company.

MOTOR VEHICLES FOR MUNICIPALITIES.

ALLOA COUNCIL report successful trials of its new Dennis fire engine.

GUILDFORD COUNCIL have obtained permission to borrow £1,700 for the purchase of a fire engine.

HASTINGS TOWN COUNCIL have obtained sanction to borrow £2,278 for the purchase of a fire engine.

NORTHAMPTON PARKS COMMITTEE have decided to order a motor mowing machine at a cost of about £600.

GLASGOW HEALTH COMMITTEE have ordered two chassis at £210 each, and two bodies therefor at £126 each.

BRIGHTON WATCH COMMITTEE have decided to purchase, for the fire brigade, three motor chassis and a motor ambulance.

CAMBERWELL WORKS COMMITTEE recommend the purchase of a Leyland 5-ton steam wagon, fitted with gulley emptier, at a cost of £1,790, less 5 per cent.

KENDAL STREETS COMMITTEE have asked their chairman and the borough surveyor to obtain particulars of mechanical haulage for submission to a future meeting.

LEEDS ELECTRICITY COMMITTEE have arranged that the mains engineer shall be allowed £100 per annum plus cost of petrol, tires, and oil for the running of a car for official purposes.

THE LACRE MOTOR CAR COMPANY have given d monstrations of an improved type of motor gulley cleanser to a number of municipal engineers in Hampstead, St. Marylebone, and Chiswick.

WOLVERHAMPTON ELECTRICITY COMMITTEE have decided to purchase a renewal battery for one of the 3½-ton Orwell vehicles at a cost of £269 (after allowing for the return of old material and battery.

GLASGOW CLEANSING COMMITTEE recommend the purchase from Electric Vehicles, Limited, of a 2-ton electric chassis complete with cab and all necessary equipment for the road, but without body, for £1,190.

PLYMOUTH WORKS COMMITTEE have decided to pay a claim by Mann's Patent Steam Car and Wagon Company, Limited, for an additional payment of £149 in respect of each of the four steam wagons supplied.

LEYTON URBAN COUNCIL'S surveyor reports that the haulage of clinker is now being done at a cost of 5s. per ton by a 5-ton iron-wheeled steam lorry, as compared with the previous cost of 6s. 9d. per ton by horsed vehicles.

THE METROPOLITAN ASYLUMS BOARD propose to purchase a motor vehicle to carry patients between the Northern Hospital and the railway station. The Board also propose to construct a petrol store at the Southern Hospital at a cost of £105, capable of holding 360 gallons.

DURHAM COUNTY COUNCIL have authorised superintendents of police in ten divisions to use motor cars. Each superintendent is to be allowed £140 yearly, including cost of car upkeep, purchase of petrol, tax, insurance, and repairs. There will also be a grant of £100, free of interest, to be repaid within twelve months.

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MOTOR TRAFFIC

Birmingham Corporation have asked their various committees, before recommending the purchase of further motor cars, to consider the possibility of using motor cycles for the officials who have to cover long distances, as motor cycles are much less expensive than cars both in first cost and upkeep, and, moreover, require no chauffeurs. If necessary a sidecar could be added to carry small articles or a second official.

Islington Cleansing Committee recommend the purchase of seven 3½-ton electric vehicles at £2,406 7s. 6d. each, one 3-ton Edison vehicle with exide battery at £2,005, and two 2½-ton Edison vehicles at £1,757 7s. 6d. each, from Electricars, Limited (Edison); one Orwell 3½-ton electric vehicle with Ironclad batteries at £1,936 10s., from Messrs. Ransome, Sims and Jefferies, Limited; two Laffly motor sweepers at £1,100 each; and a motor gulley machine at about £750.

Essex County Council have received a report that the weights and measures inspectors of the northern and southern districts had brought to notice the increase in the cost of travelling, cartage of standards, etc., and had suggested that it would be more economical for the Council to provide a motor car for use in each district. The committee are informed that horse hire, as previously employed, is now practically useless, the horses being inferior and the cost excessive, and the committee had therefore decided to give a month's trial to hiring cars under contract.

The Ministry of Health have written to South Shields Corporation concerning the application for sanction to borrow £7,500 for the purchase of motor vehicles for the collection of house refuse. The Ministry regret to learn that the motors were evidently ordered before the Ministry had an opportunity to inquire into the merits of the application, and on the evidence before them the Ministry had some difficulty in arriving at a conclusion as to the economic value of the proposal. The Ministry requested an explanation of the action of the Corporation in anticipating the Ministry's sanction to a local application. The Corporation have asked the borough engineer to reply.

Greenwich Works Committee report that they have considered the question of the desirability of adopting mechanical haulage. They have had submitted to them reports of the acting borough engineer on the subject, and in addition have had the benefit of the experience derived from the working of a petrol-driven wagon and a steam-driven wagon for a month on trial. The results of such trials had proved conclusively that the adoption of mechanical haulage would effect considerable economy. They considered that steam wagons would be the most advantageous type to use, particularly when it was remembered that the Council already had other steam-driven plant. It was desirable to decide on a particular standardised type, so that when the principle of steam haulage is extended the Council would be in possession of one type of vehicle only. They had accordingly come to the conclusion that a 5-ton rubber-tired steam wagon, fitted with a tipping body, should be purchased, and, with a view to deciding upon the most suitable make, they had appointed a sub-committee. The Works Committee recommended that the Council should purchase a 5-ton rubber-tired steam wagon, fitted with a tipping body, at an estimated cost of £1,400.

Char-a-bancs Regulations.—The Parliamentary Committee of the Essex County Council report that they have received further complaints as to the annoyance experienced from the conduct of persons travelling on chars-a-bancs. Upon similar complaints being brought to the notice of the Home Office they stated that they proposed to await the report of the Departmental Committee of the Ministry of Transport on the Regulation of Road Vehicles. The committee have since been in communication with the Ministry with a view to submitting evidence to the Departmental Committee with regard to the nuisance, and they propose to suggest to such committee where a char-a-bancs is hired the owner shall be required to furnish at the request of the police the name and address of the hirer, and that such hirer shall be subject to conviction for any offence which may be committed by any person travelling in the vehicle unless, upon demand of the police, he furnishes the name and address of the person who actually committed the offence, and renders all reasonable assistance in connection with any prosecution which may be brought in respect of the offence. In cases where the vehicle is not hired, the owner or the person in charge should similarly be made responsible for the conduct of the passengers.

MOTOR TRAFFIC NOTES.

Registrations at York.—In York last year there were registered 431 motor cars and 450 motor cycles. Fifty-five heavy cars were registered, and 827 driving licences issued.

Bradford's Double Deck Trolley Omnibuses.—Bradford Tramways Committee have applied to the Ministry of Transport for consent to the use of railless trolley omnibuses on the Eccleshill, Idle, and Thackley sections, and for the use for such purposes of double-deck vehicles exceeding five tons in weight.

Claim Against Glasgow Corporation.—Glasgow Corporation report claims by the Cerntyne Steel Castings Company for damage to a motor lorry owing to the roadway in Albert Drive having given way, and from a property owner whose railings were damaged by the accident. The claims have been referred to the town clerk.

New Arterial Road for Preston.—Preston Corporation have decided to apply to the Ministry of Health for sanction to borrow the sum of £93,940 for the construction of the new arterial road along the northern boundary of the town from New Hall Lane to Garstang Road, including the building of a bridge over the Preston and Longridge Railway.

Glasgow's Heavy Traffic.—The latest item of street damage recorded by the Glasgow Corporation is to Govan Road, 870 setts having been smashed owing, it is alleged, to the conveyance of two boilers, each weighing over 90 tons, from the premises of Messrs. Alex Stephen and Sons to Princes Dock. The firm are to be held responsible for the damage.

Perthshire Coach Traffic.—A report presented to the Western District Committee of Perthshire states that during the past season 13,359 chars-a-bancs toured the district, weighing approximately 78,690 tons, as against 292,047 tons of other traffic. On the Great North Road this traffic amounted to 30 per cent., falling to 9 per cent. on the Trossachs Road.

The Mud-Splash Demonstration.—Camberwell Borough Council now propose to hold some time in February the demonstration of anti-splash devices for motor vehicles. The delays have not been disadvantageous inasmuch as now the event will be of international importance, and will also be officially attended by representatives of the Ministry of Transport and the Commissioner of Police.

Prohibiting Omnibus and Coach Traffic.—With the aid of rural authorities the Essex County Highways Committee propose to prepare a schedule of roads which coaches and omnibuses will be prohibited from using. At a meeting of Ongar Rural Council on January 26 the chairman said that many of the roads were too narrow for large motor vehicles, and the Council must protect ordinary users.

Refusal to Pay Road Maintenance.—The general manager of the Southdown Motor Services, Limited, has informed Worthing Corporation that he is prohibited by minute of his directors from making any payment towards road maintenance, and that though the amount asked—£10 a year—is only nominal, it was a question of principle. The directors had declined to make any payment towards road maintenance anywhere.

Traffic on Narrow Roads.—The Highways Committee of Worthing Town Council have decided that it is not desirable to include any of the streets in the borough in the application which the County Council propose to make to the Ministry of Transport for an order prohibiting or restricting the driving of motor cars on roads not exceeding 16 feet in width or on which ordinary motor car driving would be specially dangerous.

Omnibus Company's Offer to Councillors.—The Works Committee of the East Ham Corporation have reported that the town clerk had submitted a letter from the London General Omnibus Company drawing attention to the dangerous obstruction constituted to omnibus traffic by the nine tree trunks in Plashet Grove, and stating that they could not accept responsibility for any accident which might occur whilst the danger remained unremedied. The letter further requested the Council to reconsider the matter with a view to enabling the safe passage of traffic, and suggested as an alternative to the removal of the trees that fenders be fixed round them. The company also offered to supply an omnibus in order that the members of the Council might see for themselves the risks involved. The committee, after having fully considered the matter, recommended that no action be taken.

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THE Tramway & Railway World
WITH MOTOR TRAFFIC SECTION

Founded 1892. LONDON, MARCH 17, 1921. VOL. XLIX.

NEW ROLLING STOCK OF THE DISTRICT RAILWAY.

EIGHT-CAR TRAINS WITH MANY NOVEL FEATURES.

In our issue of January 13 we gave a brief general description of the new cars which are now coming into service on the Metropolitan District Railway. At that time only some of the new trailer cars had been delivered, but since then a number of the motor cars have been received, and it is now possible to give details of both types. The new vehicles embody many improvements, and both from the engineering and the passengers' points of view they represent the last word in electric railway multiple-unit rolling stock. The first new eight-car trains went into service in the latter part of February, and will be followed by others.

There are in all 100 of these new all-steel cars, which were ordered from the Metropolitan Carriage, Wagon, and Finance Company, in July, 1919. The motor cars number 40 and the trailers 60. The scheme is to work eight-car trains during the busy hours, and five-car trains during the slack period.

In regard to general design, the cars are a foot wider than the old stock—9 ft. 6 in. as compared with 8 ft. 6 in. This new dimension is the maximum possible allowed by the tunnel restrictions. The body width is in fact extended almost to the limit of the step-board of the earlier type. Thus the car body overhangs the station platforms. As will be seen from the illustrations, the sides of the cars are slightly curved instead of straight. In length there is little difference, the new car being some 8 inches longer, that is to say, 49 ft. 8 in. overall. The roof is arched instead of clerestory. The exterior colouring is "engine lake," a much deeper and more pleasing shade of red than the old-fashioned vermilion. Improved springing arrangements ensure easy riding, and the large bogies with which the trailer cars are fitted will make for silence and smooth running.

The motor coaches are of higher power than their

The New Motor Car—Metropolitan District Railway.

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predecessors of the older stock, and this will increase running speed—the new trains will be capable of 45 miles per hour on "non-stop" runs—and will also accelerate starting. The improved braking equipment secures more rapid yet more even stopping.

These are all points of great importance, as the problem of getting more trains through the tunnel sections depends not only on the time taken between stations or in station stops, but also on the time taken in the processes of stopping and starting.

The following are general dimensions and weights:

Length	...49 ft. 2 in. over headstocks.
Width	... 9 ft. 6 $\frac{3}{16}$ in. over sole bars.
Height	...11 ft. 11$\frac{1}{2}$ in. rail to roof.
Centres of Bogies ...	...34 ft.
Wheel-base Centres ...	... 7 ft. 10 in. motor bogies.
	7 ft. 3 in. trailer bogies.

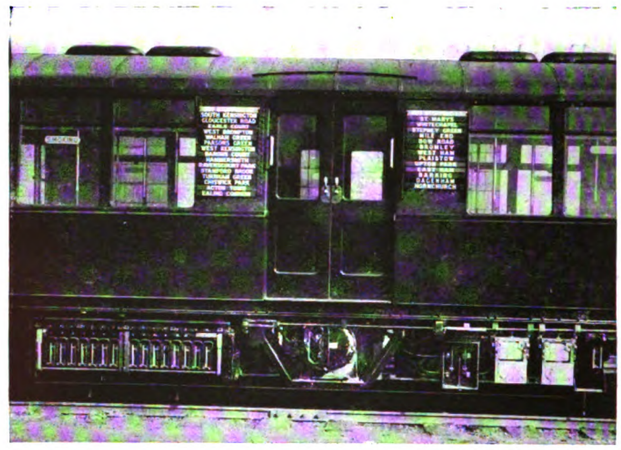
Weights.	Total weight of car.		Weight of each bogie.	
	Tons.	Cwts.	Tons.	Cwts.
Motor cars	44	10	11	18
Trailer cars ..., ...	24	10	5	3
Control trailers ...	25	16	5	8

The eight-car train is made up of three motor cars, four trailer cars and a control motor car, while the five-car train (for the slack hours) is composed of two motor cars and three trailers. A trailer car seats 48 passengers, a control trailer 44, and a motor car 40.

Doors.

The matter of doors is important both for the convenience of passengers and for reducing stopping time at stations. Each car hitherto in use had a double centre door and two single end doors of the sliding type. Each new trailer car has three double sliding doors on either side, one pair in the centre and the other pairs so arranged as to divide the car into four seating divisions. Each door is wide enough to allow two passengers to enter or leave the car side by side at one time. The doors are of the sliding pattern working on ball-bearing runners and balanced, which allows of an easy opening of both doors with one hand if necessary. End and vestibule doors are hinged and swing inwards. End vestibules in trailer cars are dispensed with to give additional seating accommodation. On the motor cars and control trailer cars, in addition to the three double doors, single doors are fitted at the ends of the cars, and these doors will also be available for the use of passengers when not occupied by the operating staff of the train.

An eight-car train of the new stock gives the equivalent of 52 single doors throughout its length for the use of passengers entering or leaving the train. The provision of these facilities for alighting and entering will still futher reduce the time taken in loading and unloading at stations, and will thus accelerate the operation of trains and enable more trains to be run.



Centre Door of Motor Car.

Seating and Other Interior Arrangements.

These are well shown in the accompanying drawings and photographs. The scheme was matter for a good deal of study with a view to providing an adequate number of seats while at the same time giving the necessary standing room with quick egress. Cross-seats are provided towards the ends of the car, while the centre part has longitudinal seats. There is a good deal of through traffic on the District Railway from the suburban termini to the central district and *vice versa*, and it is felt that passengers from the terminal points will quickly learn to take the cross-seats which are away from the flow of passenger traffic at intermediate stations, and so remain comparatively undisturbed throughout their journey, while the area between doors will be available

One of the New Eight-Car Trains of the Metropolitan District Railway.

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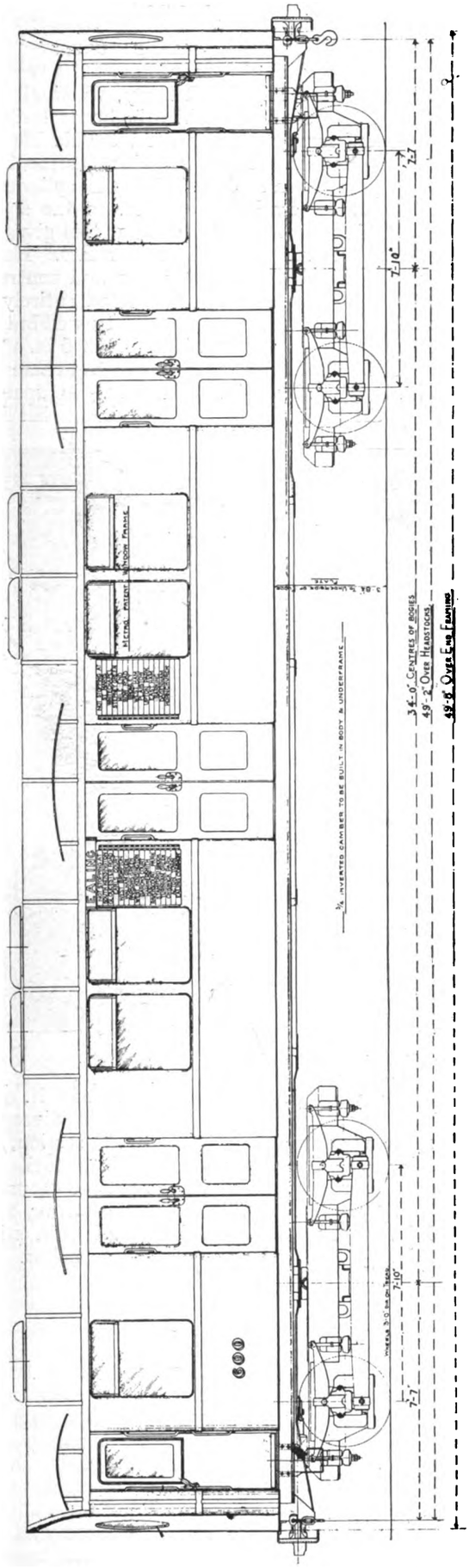

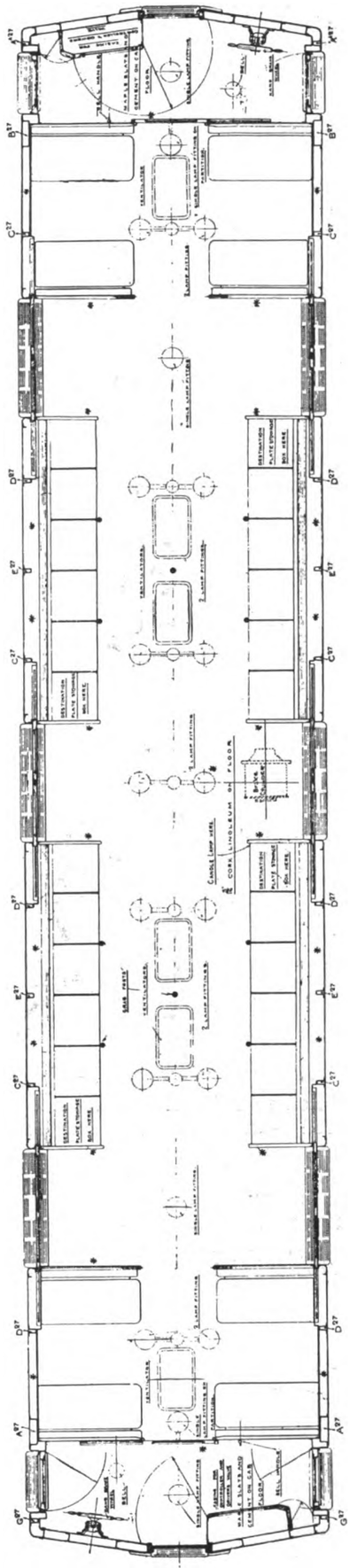

Plan and Elevation of the New Motor Cars—Metropolitan District Railway—Seating 40 Passengers.

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for short distance passengers, with rapid egress and ingress at stations. A form of seat has been devised similar to that in the new cars on the Great Northern Piccadilly and Brompton Railway, described in our issue of February 17. It is of such a form that the passenger for comfort's sake is encouraged to sit upright and not to sprawl. Thus he has to keep his feet tucked in, and so to allow more space for standing passengers and for the movements of those leaving and entering. The seats in the first-class cars are upholstered in red plush, and those in the third-class in pegamoid of old leather finish style.

A point which greatly enhances the appearance of the cars is the slightly sloped sides and the gracefully arched roof. The windows are of best polished English ¼ in. plate glass; the ovals at the ends have a good effect. All interior metal fittings are finished in Florentine bronze or nickel-plated. The whole of the interior is finished in steel, the panelling and

Interior View of One of the New Cars of the Metropolitan District Railway.

mouldings painted to resemble teak. The floors are of steel, covered with linoleum, and the roofs with asbestos millboard. To ensure absence of vibration and drumming, the steel work has been covered with canvas so that a maximum of quietness and smooth running is expected. Grab posts in centre and at longitudinal seats, also handles on seat backs, have been provided to minimise the discomfort of passengers who may be forced to stand. There are no straps.

Six large ventilators of an improved pattern are fitted in the roof, and wind screens on each side of the doors. Lighting of the cars is exceptionally well carried out and provides for seven centre roof two-lamp fittings of pleasing design, also six single lamp fittings (two at each end of the car and two in the centre), all enamelled white. Heaters, 20 in number, are placed under the seats. Each window has a ratchet spring roller blind. Considerable attention has been given to the subject of car springing, and the result should leave nothing to be desired in the matter of easy riding and smooth running.

One of the features of interest to the public is the provision of two sets of train indicators, one on each side of the centre door, showing "non-stop" stations.

Mechanical Features.

Inside-hung single brake blocks have been the practice on the District Railway, Westinghouse equipment being used. The Westinghouse brakes on the new cars, however, are on the double block system, and are provided with automatic adjustment for taking up any slackness. Calculating the cylinder pressure with full application at 50 lbs. to the square inch, and taking the leverage 4·4 to 1, this gives 39·6 tons total block pressure on the motor cars. Hand brakes are also fitted to all motor cars and control trailers.

The underframes are constructed entirely of steel; 6 ft. by 3 ft. 0⅜ in. bulb angles untrussed but cambered up form the sole bars which are 8 ft. 6 in. apart. The centre longitudinals are of rolled steel channel sections 8 in. by 3½ in. by $\frac{7}{16}$ in. spaced 2 ft. 3 in. apart and running the whole length of the frame between bogie centres where they are brought in to 1 ft. 4 in. apart. The extension to headstocks again diverges and is made up of pressed steel channel section, 7¼ in. by 4 in. by $\frac{7}{16}$ in., deepened at the headstocks end. The cross bearers at the bogies are pressed channel sections ½ in. by 7¾ in. plate, deep at the centre, tapering to 6 in. at the sides with flanges of 3 in. stiffened by ¼ in. plate above and ⅜ in. plate below. The floor plates are stiffened with short angles and pressings across from sole bars to the centre longitudinals. The whole is stiffened up with four gusset plates between the bogie centres.

Each motor bogie is equipped with two 190-H.P. tapped field motors which are of the enclosed type, self-ventilated. The motors are hung on the axles and supported by brackets extending from housing plates. The driving wheels are 36 in. in diameter. The motor bogie side frames are of channel section, 12 in. by 3½ in. by ½ in., running the whole length of 13 ft. to the headstocks, but are cut away on the bottom flange to receive the axle boxes. The headstocks are 8 in. by 3 in. by ⅜ in. channels with a ⅜ in. plate gusset

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at each corner. The bolster housing plates are 12 in. by 3½ in. by ½ in. channels stiffened with double gussets at each side. The bolsters are built up of 8 in. by 3 in. channels 5½ in. apart and stiffened top and bottom with $\frac{5}{16}$ in. plates. These are supported on nests of concentric coil springs mounted on the spring plate which is a channel pressing of 11 in. by 4 in. by ½ in. plate, and the upper edge turned over to form a flange of 2½ in. This in turn is supported by heavy steel forgings pivoted to cast-iron brackets fastened to the housing plates. The centre bearing is of a ball bearing type. The journals are 9 in. by 5½ in., and the boxes which slide on cast steel horn-plates 4½ in. wide are of heavy cast steel, bearing on laminated 3 ft. 9 in. centres composed of ten plates $\frac{9}{16}$ in. thick, eye-bolts taking up the load through auxiliary rubber springs *via* steel eye-bolt brackets rivetted to the side frame channels. The trailer bogies follow the same construction, but they are lighter.

Modifications from the hitherto standard design have been made in the draw and buffing gear. In the drawhead, in order to get in the larger wheels and to allow of a more generous design of bogie, the old arrangement of carrying back to the king-pin has been abandoned, and a short draw-bar fixed to the longitudinal members has been substituted. In order to obtain light locking between the cars and to provide a continuous tread-over plate between them, a central spring buffer of generous dimensions has been fitted. The draw-bar passes through the centre of the buffer.

Electrical Equipment.

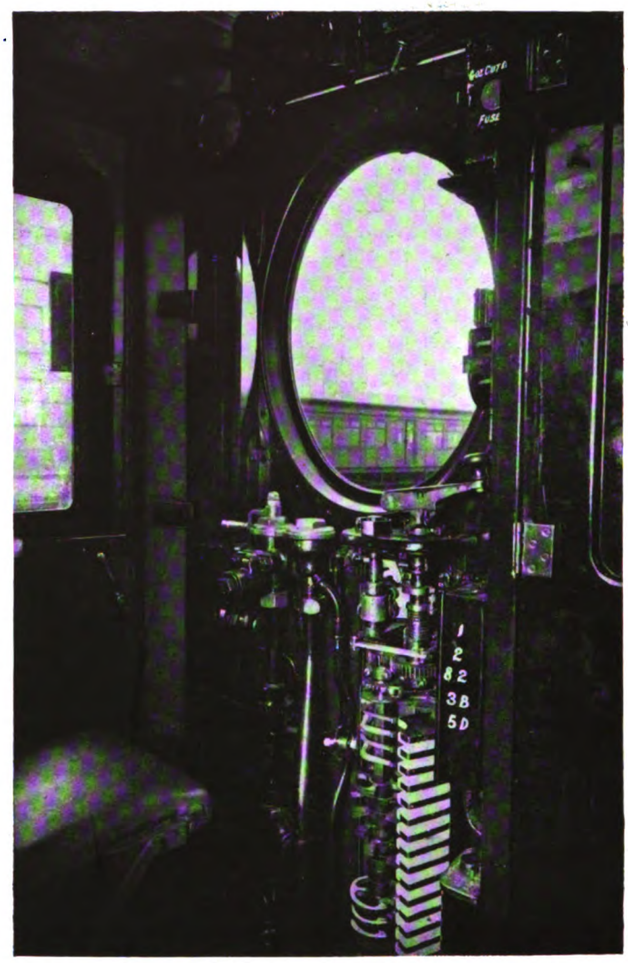
The motor cars are each equipped with four GE 260 motors. These motors are of the interpole tapped field self-ventilated type and are rated at 198 H.P. for one hour, and 182 amperes continuously. The motors are fitted with 20-tooth pinions, gearing with 63-tooth gear wheels and provided with bolted type axle caps and dust shields for the axle. The suspension bearing brasses are keyed to prevent rotation. Each pair of motors with its control gear constitutes a complete unit equipment.

The control gear, mounted under the car, consists of circuit breaker, main switch, fuses, reverser, 15 contactors, resistances, and tapped field relay. The contactors are of an improved type. The contact tips are provided with arching horns and a moulded arc shoot. The interlocks are of the disc type mounted on the back of the contactor. The contactor box with all contactors, resistances, etc., is a unit complete with wiring and has its own terminal base. The reverser connected to the motor fields is of a drum type operated by a pair of opposed solenoid coils. Other apparatus is substantially the same as previously used.

Master controllers of an improved type are fitted at each end of each motor car, and at one end of the control trailer car, together with the necessary control and compressor switches, circuit breaker switch, fuses and control, cut-out switch. The control is non-automatic except that the motor field is weakened automatically by the tapped field relay on the current decreasing on the last controller point in parallel.

The eight-car train has an acceleration of 1½ miles per hour per second and a balancing speed of 45 miles per hour, attained after one mile on the level. The time for a section ·51 mile in length is eighty seconds, excluding stops.

The equipments were supplied by the British Thomson-Houston Company. This firm also supplied the air compressors and governors, the former being of the C.P. 30 type and size. Heaters consuming 300 watts each were supplied by Simplex Conduits Limited, and are mounted behind pierced gratings in the seat risers, 20 per car in series. The cars are lighted by twenty 30-watt lamps with white opal reflectors mounted on white enamelled fittings supplied by Veritas, Limited. The heating and master lighting switches are of the 30 ampere class S.W. switches made by English Electric and Siemen's Supplies, Limited. All lighting and heating fuses were supplied by Simplex Conduits, Limited, and local lighting switches by Messrs. Lundberg and Company. The lighting jumpers were made by Messrs. McGeoch and Company, while the power and control jumpers formed part of the B.T.H. equipment. The undernoted items were supplied by the firms mentioned—



The Controller, Brakes, Valves, etc., in Driver's Compartment.

Bearing springs, Messrs. Willford; bolster springs, Messrs. Timmis; rubber springs, Messrs. Spencer Moulton & Co.; brake gear, Messrs. Westinghouse Brake Co.; seats and blinds, Messrs. G. D. Peters & Co.; roof millboards, Messrs. Bell's United Asbestos Co.; linoleum, Messrs. Nairne; paints and varnish, Messrs. Docker Bros.; metallic fittings, Messrs. J. Beresford and Sons; wheels and axles, Messrs. Taylor Bros.

STANDING PASSENGERS.

In the House of Commons on March 7, Mr. Bowerman asked the Home Secretary when it was intended to withdraw the war time permission regarding the overcrowding of tramcars and omnibuses, in order that the users of such vehicles might travel in comfort and the conductors carry on their work under reasonable conditions.

Mr. Shortt replied that the matter was being kept in view, but he was informed that if these concessions were withdrawn there would not be enough vehicles available to carry the public.

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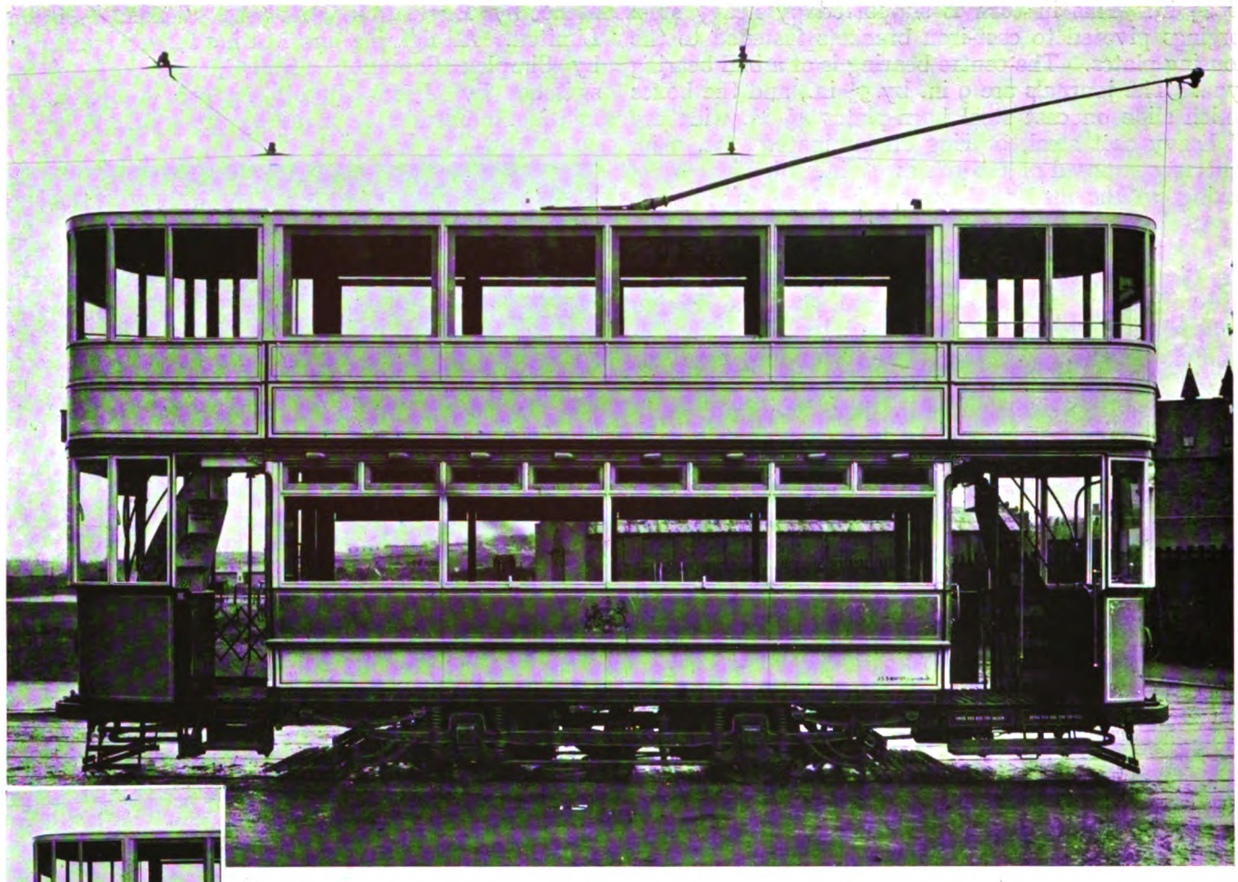
NOTABLE NEW CARS AT BELFAST.

FEATURES CONDUCING TO SAFE AND RAPID WORKING.

Tramway undertakings and their passengers both stand to gain from the fact that in making good the shortage of cars due to the suspension of construction during the war, general managers are seeking to secure vehicles of improved design. It is further a matter of congratulation that car builders and manufacturers of equipment are anxious to further the quest. A noteworthy instance of this dual effort of enterprise is to be found in the photographs and drawing given on this and the following pages of the new cars supplied to the order of Mr. J. S. D. Moffet, general manager of the city of Belfast tramways. Mr. Moffet's experience of heavily loaded cars at West Ham convinced him of the need for improvements in car construction, and the decision which he came to in East London would in due time have been put into execution there, following the good work he accomplished in rebuilding existing stock in his own shops. Removal to Belfast in 1916 has served to strengthen his conviction, with the result that he has now the satisfaction of placing in service a number of cars eminently suited to rush period requirements and to greater comfort and safety for passengers and of the car crews.

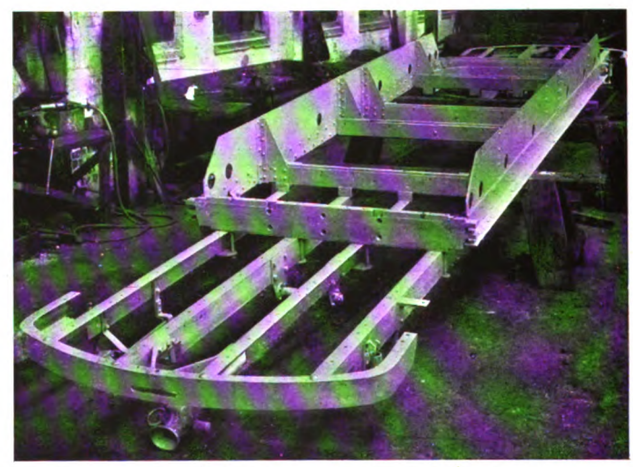


New Standard Car of Belfast Corporation Tramways with Front Exit.

Front Exit Closed.

FRONT EXIT FOR USE AT BUSY CENTRES.

From the photographs and drawing, for which we are indebted to Mr. Moffet and to the Brush Company respectively, it will be seen that the most prominent new feature is that the staircases are placed so as to permit of passengers leaving the car by way of the near side front platform. The principle of this arrangement is not new; it was sanctioned by the Board of Trade more than a dozen years ago in the case of double deck cars at Huddersfield, and cars thus worked in that town and in the city of Newcastle, besides places abroad, have been illustrated from time to time in these pages. In Belfast this added convenience is proving of great utility at Castle Junction and other busy termini. At stopping places where there is no



Steel Floor Frame of Belfast Car.

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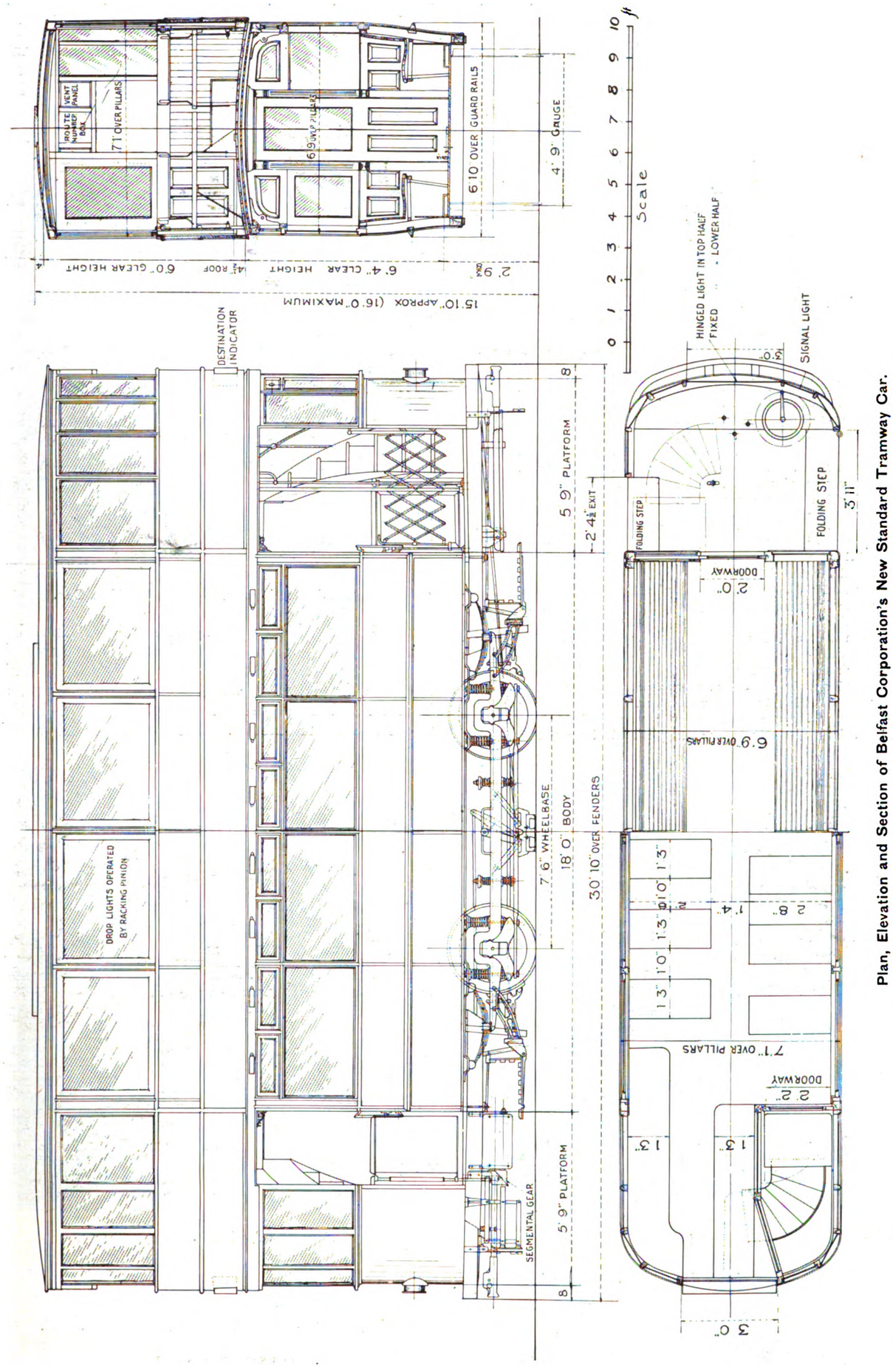

Plan, Elevation and Section of Belfast Corporation's New Standard Tramway Car.

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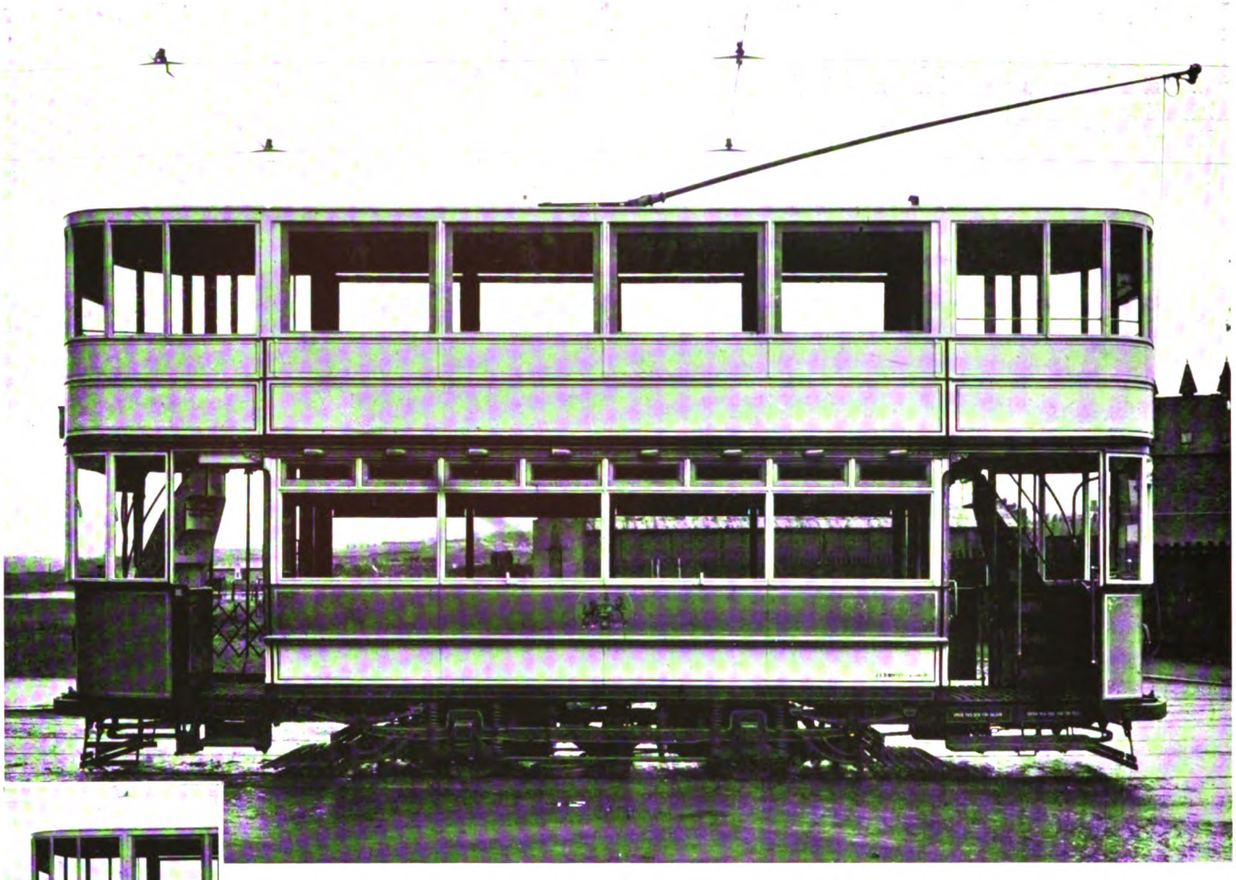

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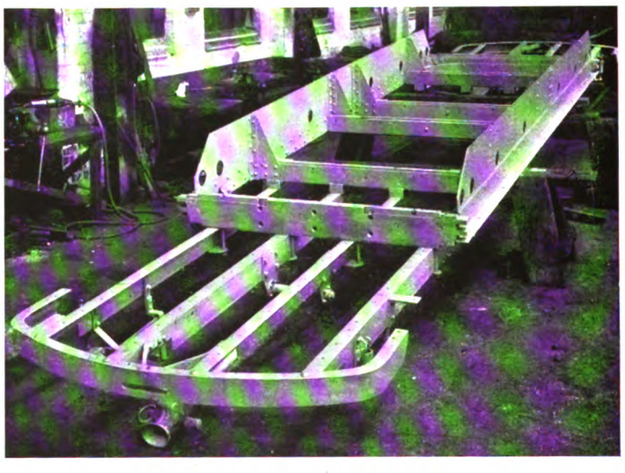

Steel Floor Frame of Belfast Car.

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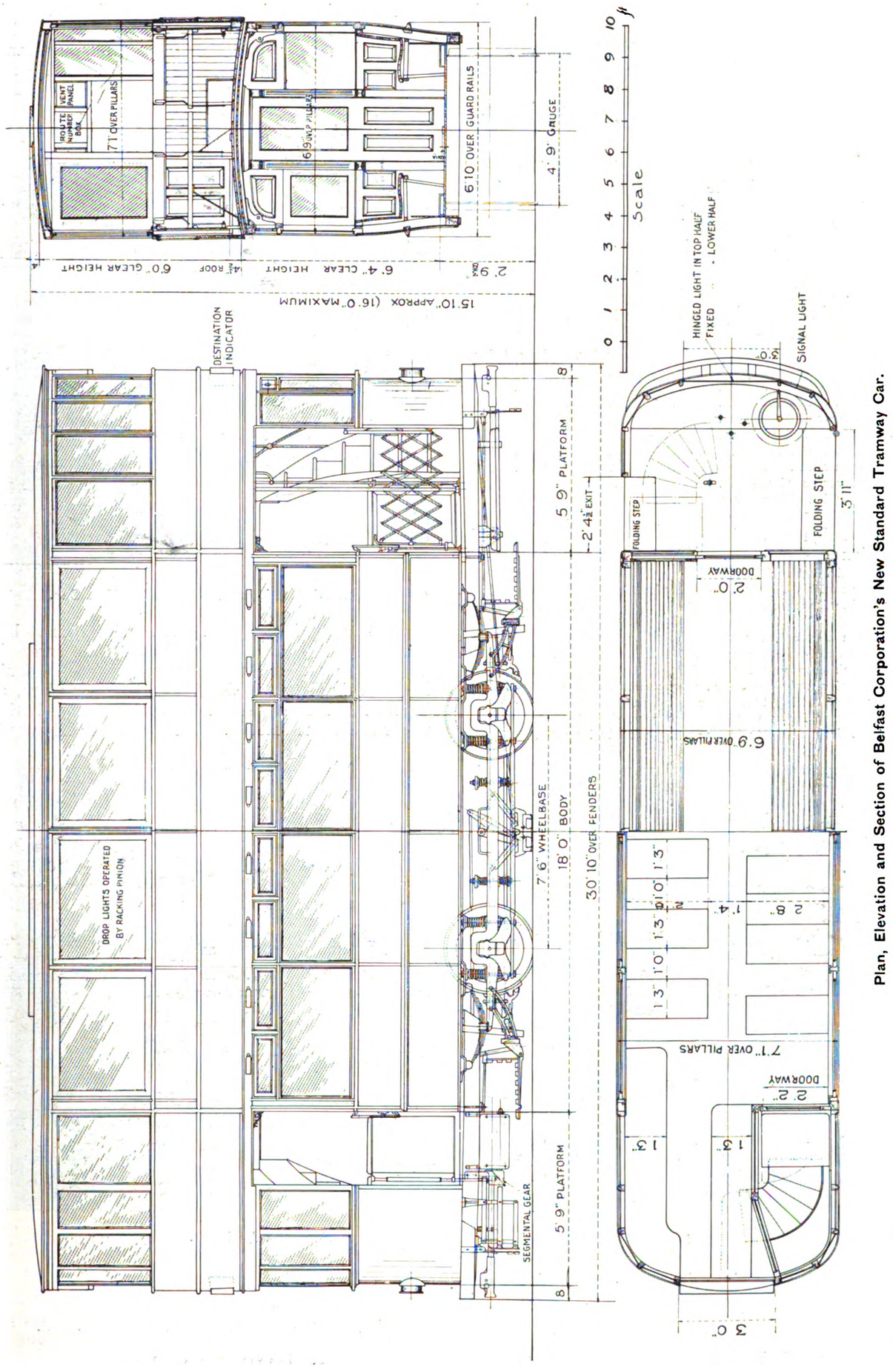

Plan, Elevation and Section of Belfast Corporation's New Standard Tramway Car.

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pressure the rear platform is used both for incoming and departing passengers.

All the advantages apparent in the new car have been obtained on a single truck, constituting a notable departure from the existing standard Belfast car, and in certain features an advance on any type in service in the United Kingdom. A marked feature is the increased capacity, the improved pattern accommodating 26 persons inside and 42 outside, making a total of 68 as against 56 in the old cars, made up of 22 inside and 34 on the top deck. Although nominally providing 12 extra seats, the new car in wet weather gives 36 per cent. more seating room, or accommodation for at least 20 more passengers.

Dimensions and Novel Features.

The main dimensions compared with the present cars are as follow—

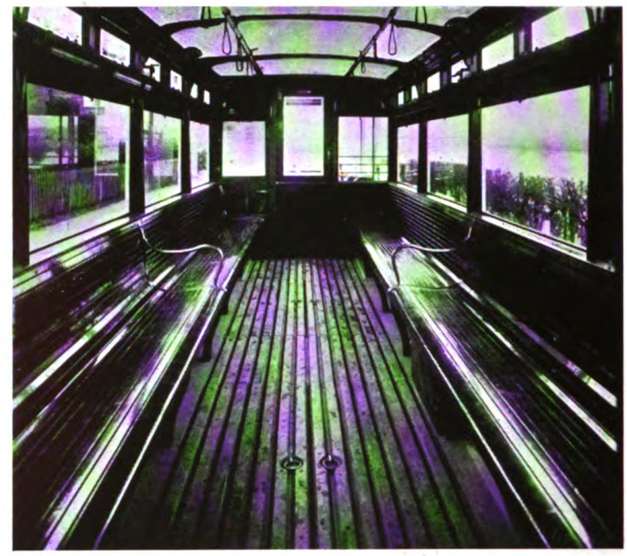
Description.	New Car.	Present Car.
Truck wheel base	7 ft. 6 in.	6 ft. 6 in.
Length of body	18 ft. 0 in.	16 ft. 0 in.
Length of platform	6 ft. 0 in.	5 ft. 6 in.
Length over platform	30 ft. 0 in.	27 ft. 0 in.
Length over buffers	31 ft. 0 in.	28 ft 0 in.
Height to top of trolley plank ...	16 ft. 0 in.	16 ft. 0 in.
Rise from road level to floor ...	2 ft. 10 in.	2 ft. 10 in.
Width over guard rail	6 ft. 10 in.	6 ft. 10 in.
Overall width of top cover ...	7 ft. 2 in.	7 ft. 2 in.
Inside width of top cover ...	6 ft. 8 in.	6 ft. 7 in.

The design embodies many new features, the chief of which are—

Increased length of lower saloon.
Totally enclosed top deck, instead of a shelter over the body only.
Near side front exit for use at Castle Junction and other busy termini only.
Platform vestibule for protection of motormen.
Longer wheel-base truck with wide wing axle boxes fitted with a shock absorbing device, also increased length of spring base.
Steel girder under-frame which supports the car body designed for present day traction conditions.
Special gear for use with trailer cars, should it eventually be decided to adopt train or multiple control operation.

from the point of view of platform accidents. This is brought about by the fact that the signals consist of two separate and distinct sounds given by means of (1) a buzzer to stop, and (2) a single-stroke bell to start. The former is for the use of both passenger and conductor, and the latter for conductor only.

The provision of a signal for the use of passengers is



Interior of Lower Saloon of Belfast Car.

a great convenience, as the conductor cannot be on the top deck and on the platform at the same time. Consequently it is now the passenger's own fault if he is carried beyond his proper stopping place, as a liberal number of pushes have been fitted in both the upper and lower saloons. The motorman knows when he hears the buzzer that it means "stop," and that on no account must he start his car again until he hears the bell signal. Thus there can be no excuse for platform accidents due to the motorman mistaking the bell signal as may happen on cars fitted only with a bell.

Views of Upper Saloon of Belfast Corporation's New Standard Car.

The high-tension signalling arrangement is unique, in so far as Belfast is the first tramway system in Europe to adopt it. Its advantages are greater facilities afforded to passengers for stopping the car as and when desired, and its greater safety feature

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Amongst other improvements, all of which tend to convenience and comfort, are the following.

The seats in the top cover, which are of the broad slat type, 2 ft. 8 in. long, 15 in. wide, with 12 in knee space, are staggered or arranged so as not to be opposite each other, with a view to facilitating the movement of passengers along the gangway. They will be found to be much more comfortable and provide greater knee space than the garden seats on the present cars.

Open seats are without heel boards, except at the ends where the sand gear requires protection. This is more hygienic. The same may be said with regard to the plain mouldings throughout the car. Another feature is the division of the length of the longitudinal seats in the lower saloon, each into two sections, by means of a curved brass arm rail, fixed near the centre.

Ventilation in the lower saloon is partly by fixed and partly by movable ventilators, the latter being operated

Front View of Belfast Car.

on the link rod principle. In the top cover the ventilation is regulated by raising and lowering the side windows, and by four end ventilators.

The lighting scheme provides for 24 metal filament lamps, nine of which are in the top saloon and 10 in the lower. A generous number of match-striking plates have been fitted in the upper saloon, and special boxes on the platforms for the reception of used tickets. The number boxes at the ends of the cars will be used to indicate the number of the route travelled over.

The electrical equipments are of the latest type and consist of box frame interpole, ventilated motors capable of developing 40 H.P. per motor, and Dick-Kerr "K" type controllers. The controllers embody several improvements which are of great value from both safety and maintenance points of view.

The car bodies and trucks have been constructed by the Brush Electrical Engineering Company of Loughborough, and the electrical equipments have been manufactured by the English Electric Company.

FAST TRAMWAY TRACK FOR LIVERPOOL.

The scheme has been adopted which Mr. J. A. Brodie, City Engineer of Liverpool, recently recommended for a fast tramway track with rails laid on sleepers along Prince's Road, and future provision of facilities for the districts of Woolton, Allerton, and Garston.

The report of the engineer was in part as follows:—The tramways in Prince's Road occupy a central position in the paved carriage way, and the question before the committee is whether the tramways are to be reconstructed as a paved tramway in the central position, or whether they are to be constructed close to the kerb along the Boulevard in the same carriage way as a quick track suitable for fast tramway traffic.

The engineer considers the matter one of extreme importance. He looks upon Prince's Road as the only route along which reasonably fast tramways can now be constructed to meet the requirements of the Garston district, of the Allerton housing district beyond Rose Lane, and the Woolton district by way of Menlose Avenue, and of a portion of Childwall district, the plan of which had been approved by the Reconstruction Committee.

This area represents the whole outlying land lying within the city boundary still capable of development.

Other routes through these areas have been carefully considered, but the cost of pulling down existing buildings and widening existing roads, such as Smithdown Road, etc., make the cost prohibitive, whilst by making use of the Prince's Road route a cheap and satisfactory service can still be provided for the whole of these areas.

The Health Committee have already made arrangements for the widening of Aigburth Road beyond Aigburth Vale, and for the construction of a new road through the Woolton housing areas, in both cases not less than 120 feet wide, and a preliminary promise has been made by the Ministry of Transport to contribute 50 per cent. of the cost of the street works on these and some other arterial roads on condition that the work is carried out by demobilised men obtained through the medium of the labour exchanges.

Dealing first with the length of Prince's Road, it is estimated that the cost of constructing a tramway in the new position will be £29,759. The estimated cost of reconstructing the existing tramways over the same length, with paved surfaces, will amount to £31,556, including overhead equipment in both cases.

It will be seen that from the tramway point of view the fact that the tramway will be constructed on sleepers, and will therefore be quieter and less costly in maintenance, coupled with the removal of the tramways to a greater distance from the houses on the west side, should be definitely in its favour.

The widening of Prince's Road and Ullet Road between the end of Croxteth Road and Greenbank Road, and the construction of a new road by way of Allerton Road, through the housing area, exclusive of the tramway, amounts to £234,500. The construction of the tramways for these lengths of the quiet and fast tramways will amount to £117,911.

The engineer cannot too strongly call the attention of the committee to the importance of the decision now being arrived at if a satisfactory fast service is at any time to be given to the areas now under consideration, which lie at distances of from five to six miles from the Town Hall.

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THE
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THE EDITOR will be glad to consider articles by experts. All information of a practical character relating particularly to the engineering and operating branches of transportation will receive prompt attention. Original illustrations will also be welcome.

LONDON, MARCH 17, 1921.

Railway Electrification.

At the recent annual meetings of British railway companies very few references were made to prospects of further electrification of steam lines. Such as were made only went to confirm the belief that nothing substantial in this direction can be undertaken in the meantime. No one questions the desirability of the change on many railway lines; the difficulty is purely one of finance. The railway companies are at present in a difficult financial position, and developments in other directions, as well as in regard to electric traction, have to be held up. A feature indeed of many of the speeches at the meetings was that no new capital expenditure must be incurred unless it is absolutely unavoidable. To that may be added the fact that the companies cannot at the present time raise additional capital except on almost prohibitive terms. Out of the present welter in the railway world must emerge more settled and prosperous conditions before large developments in any direction can be undertaken. In addition to these things there is the enormous price of labour and materials, resulting in new works of any kind costing three or four times what they would have cost before the war. An example of the position was given by the chairman of the London and South Western Railway. The intention of that company was, after the conversion of their suburban lines, to continue the electrification as far out as Guildford. The first step in that direction, contemplated a year ago, was to deal with the Cobham and Leatherhead lines. But, as the chairman said at the recent meeting, when the directors wanted to place contracts they found that the prices of electrical equipment had advanced to such an extent as to make it doubtful whether the work could be carried out for £1,000,000, as compared with a pre-war estimate of £250,000. There was also the uncertainty as to the future of the railways, so the scheme remains in abeyance.

Delays Elsewhere.

At the meeting of the London, Brighton, and South Coast Railway, the chairman said that the directors were anxious to get on with their scheme of further electrification. Over a year ago they had approached the Government for sanction to proceed, but they had not managed to carry the matter much further. In the case of the London and North Western Railway, the chairman, on the matter of electrification, referred to no future scheme, and dealt only with the pushing on to completion of the work between Queen's Park and Chalk Farm, which was held up owing to the war. It is to be finished next year, and electric trains will then run into Euston. Although so much has been said for a long time about electrifying the suburban lines of the Great Eastern Railway, and the main line of the North Eastern Railway from York to Newcastle, little reference to these projects seems to have been made at the recent meetings of the companies concerned. An encouragement to advance as soon as conditions become more favourable would be given if the big steam railway companies which have electric lines in operation were to publish figures showing the cost of electric working, the receipts, and the growing nature of the latter. In a combined steam and electric undertaking it is difficult to get out definite figures for the electric section; but these figures are obtained, and are at the disposal of the officers and directors. Surely

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some information of a definite character might now be given to the public. The chairmen of both the Brighton and the South Western Companies spoke very highly of the benefits which had been derived from electrification. In fact, the South Western chairman said that it is still proving an immense success. Therefore the electric traction and indeed the whole railway field, would be much benefited if the Brighton, the South Western, the North Western, and the Lancashire and Yorkshire Companies were to issue approximate receipts and expenses for their electric lines. They could also include an indication of what the figures would mean at pre-war levels of costs and fares. On the whole subject, it may be hoped that the future of the railways will be made clear and satisfactory by the Railway Bill which the Government intend to pass this year.

Electrification and Traffic Working.

Railway electrification in relation to traffic working was discussed by Sir Philip Nash, director-general of traffic, Ministry of Transport, in a paper read before the Institute of Transport on February 28. Sir Philip put forward the advantages and disadvantages of electric traction, and pointed to various considerations that are fairly well known. He views the subject without the preconception of the electrical propagandist, and discusses it with judicial impartiality. One of his conclusions is that experience in this country has shown that the projects have thoroughly justified themselves by creating new traffic, and are not in themselves, nor were they necessarily intended to be, means of saving expenditure. In his view the electrification of main lines can only be expected to show direct savings when traffic is very dense; and the principal fields appear to be short-haul passenger services, operation of terminals in large cities, freight haulage over lines of heavy traffic, and freight shunting in large yards. To the two latter purposes more importance is attached than is sometimes recognised by writers on the subject. In general Sir Philip Nash thinks what most students of transport long since recognised, that the doom of the steam locomotive is a long way off. He rightly maintains, however, that that should not discourage any advocate of electrification, as electrification is now in many cases justified, and will slowly but surely take place. The prospects offer a large and profitable field for both electrical engineers and manufacturers. All this is quite true, but the difficulty remains of finding capital, and the drawback of high cost of labour and materials will be felt for some time to come. Yet the time when rapid development will be practicable may come sooner than many observers now anticipate. As Sir Eric Geddes remarked the other day, railway chairmen, in view of the momentous bargain that will soon have to be made between the Government and the railways, think it policy to go about in rags, but they have better clothes at home. British railways have, in fact, by no means lost their initiative and energy; and there are great improvements in prospect, however clouded the immediate future.

Traffic at Car Stops.

The London representatives of the motor organisations have approached Manchester Corporation with a view to securing the withdrawal from their Parliamentary Bill of the clause requiring drivers of motor vehicles to remain stationary at stopping places when people are boarding or alighting from a tramway car. The Motor Legislation Committee suggest that the Corporation "already possess full powers to deal with special cases of traffic congestion," but do not explain how such powers will assist in lessening the danger which the clause referred to is designed to remedy. Probably what is in their mind is the section of the Motor Car Act under which a person can be charged with driving to the danger of the public. While it is conceivable that such proceedings might be successful, there would have to be officials on duty for the purpose of collecting the evidence, a procedure entailing expense that no tramway undertaking can afford, so that this offers no prospect of reducing the danger. The Committee go on to urge the Corporation "in these circumstances not to imperil the Bill by persisting in a clause strongly opposed by a large and influential section of their constituents." Now, Committees of the Legislature do not throw out the whole of a Bill seeking

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various powers because the promoters fail to sustain one clause. What the Motor Legislation Committee intend to convey is a threat that their supporters in Parliament will be asked to secure the rejection of the whole Bill when reported to the House, but it remains to be seen whether the Government and the Members generally would permit such unjustifiable manœuvres to succeed. Several municipalities are this session seeking a similar clause to that applied for by Manchester, relying on the fact that Glasgow has for some years had experience of its benefit for the protection of car passengers. In the case of Manchester the clause was inserted after a large majority of the ratepayers voting had declared in its favour. The inference is that each of the four towns has good reason to complain of vehicle drivers showing a disregard for public safety, and if that is the case the motor organisations cannot be held free from blame. Their Legislation Committee would have displayed more wisdom had they taken steps to form committees for carrying on a Safety First campaign, and to secure the active co-operation of the municipalities rather than having recourse to threats and obstructive tactics. Probably it is not too late to inaugurate action on the lines proposed. Whether the clause is passed or not a safety movement is essential.

Slow Moving Traffic.

Tramway authorities in the Metropolis and elsewhere will probably not endorse the attitude which the Home Office have assumed towards a by-law requiring slow moving vehicles to keep as close to the kerb as is practicable. The regulation which the Whitehall authority has refused to sanction was submitted by the Middlesex County Council, whose tramways are worked by the Metropolitan Electric Tramways Company, and reads as follows—

> Every person driving or being in charge of any vehicle which is moving at a slow pace in any street shall, as far as practicable, keep the vehicle to the left or near side of the street and close to the kerb, or, where tramway lines are laid, upon the left or near side of the street, as close to such lines as possible, but so as not to obstruct any tramway carriage using such lines. Every person who shall offend against this by-law shall be liable for every such offence to a penalty not exceeding forty shillings.

The proposed by-law recognises the importance of keeping slow-moving traffic off tramway lines where they are laid along the near side of the road, and so avoids the confusion which would result in many places in London from a simple direction that slow moving vehicles must keep as close to the kerb as possible. By following the instruction in such places, to keep near the tramway lines but not on them, serious hindrance to tramway services and much wear to tramway track will be avoided, while the path of faster conveyances seeking to pass on the outside will be left as free as possible. The Home Office came to their decision after consideration of the views of the Commissioner of Police and the Ministry of Transport. The former stated that experience of the working of a similar by-law obtained by the London County Council shows that it adds little, if anything, in practice to the powers contained in the Highways Act, 1835. Some reasons may, however, be advanced in contradiction to this official opinion. A similar regulation exists at Glasgow, and we believe that it has been found of service in cases where there is no actual obstruction of a tramway car by another vehicle being driven on the metals in the centre of the road. When the latter procedure is persisted in to an extent sufficient to obstruct, tramway managers have a ready means of redress under ordinary law, but before this point is reached all descriptions of fast traffic may be obstructed by a horse wagon or a slow moving steam lorry using the crown of the road, while tramway tracks are severely damaged by the heavy mechanical vehicle. The motor interests have been foremost in advocating compulsory measures for keeping slow vehicles to the near side, for unless that course is adopted the fast moving machine has to restrict its speed. We shall be surprised if the decision of the Home Office is not regarded with dissatisfaction by Metropolitan owners of motor vehicles as well as by tramway managers.

NORTH WESTERN RAILWAY ROAD MOTORS.

It was announced by the deputy chairman at the annual meeting of the London and North-Western Railway Company on February 25, that the estimate of capital expenditure for 1921 included £100,000 for the purchase of additional road motor vehicles. Referring to the increase of local authorities' rate demands, he said the amount paid by the company in 1913 was £639,000, and in 1920 it had increased to £1,248,000, equal to nearly 3 per cent. of the dividend on the ordinary capital, and he feared there were no signs at present of its diminishing, whilst their competitors, the road motors, freely used, at a trifling expense to themselves, the roads to the upkeep of which the railway companies contribute so largely. He was glad, however, to notice that the ratepayers generally throughout the country were taking keen interest in the question of local rates, which pressed so heavily upon the community, and which undoubtedly called for drastic action.

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RAILLESS TRACTION AT YORK.

By An Engineer.

The inauguration of a railless service in the city of York is an event worthy to be recorded even in the long and stately history of that ancient borough. In the relatively modern story of public passenger transport it marks an epoch.

York is typical of many towns throughout the United Kingdom in which the present prohibitive cost of permanent way vetoes much desired extensions of the tramway system. The need of increased facilities shows no corresponding diminution, but constantly grows in extent and urgency. The construction of housing colonies, the increased prosperity of the working classes, their greater leisure, their desire for a larger share of the comforts and conveniences of modern civilisation—all these factors unite in supporting with ever increasing insistence the demand for more extensive and more ample means of passenger transport. So overwhelming a force would long since have compelled the construction of hundreds of miles of tramways had it not encountered the obstacle of finance. No municipality, even if it found itself able to raise the money, has been willing to impose upon its ratepayers the burden of a costly installation the financial success of which was at the best doubtful.

Yet something had to be done, some means had to be found, if not to satisfy, at least to placate, the clamant demand for public conveyance, and everywhere, with a few notable exceptions, the same expedient was adopted. On hundreds of miles of routes, alike on the outskirts of great cities and on the main streets of smaller towns, motor omnibus services were installed. In the minds of many harassed authorities the motor omnibus appeared not merely as an expedient, but as a competent substitute for tramways on *all* new routes. To some it even promised relief from the outlay on renewal of worn out tracks. To a large extent these expectations were founded on the extraordinary success of the omnibuses in London, and it was not always realised that that success was due not solely to remarkable technical ability but also to unprecedented density of traffic.

In most cases the first results of the motor omnibus experiment confirmed the hopes of those who had embarked on it. The services were popular, earnings were high, new traffic was brought to their existing tramways, and working expenses left a margin of profit. Some of the more enthusiastic adherents of petrol motors, amongst them not a few managers of tramway undertakings, began even to foresee the partial replacement of tramways and a vast extension of public passenger transport by motor omnibus.

No very long experience has been needed to upset the optimistic expectations of those who overlooked the disadvantages of the internal combustion engines. It was found that repairs were numerous and costly, that frequent overhauls reduced the annual mileage of the vehicles calculated upon, and that the useful life of a motor omnibus was somewhere in the neighbourhood of five years. Finally, just when revenue was being swallowed up by expenses, the price of petrol was raised until the cost of fuel reached the abnormal figure of 8d. per car-mile, and many services that had been launched with hopes of profit are now being operated at a loss.

The effects of these unfortunate experiences have been threefold. The genuine need of far more extensive means of transport than are as yet available has been confirmed and emphasised, the suitability of rubber-tired vehicles has been abundantly vindicated, and the cost of propulsion by internal combustion engines has been proved to be excessive. Concurrently with the numerous experiments with petrol there have been

Railless Cars at York—Views Showing Flexibility of the System.

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relatively few trials of railless trolley vehicles, but the results have justified the expectations. Propulsion by electric power derived from a central station has long since been admitted to be the most economical and effective agency for urban and suburban traffic on rails. The same method is now also being recognised as the best and cheapest agency for urban and suburban traffic on rubber tires.

In York the economic barrier to tramway extensions is reinforced by physical and other obstacles. The districts to which it is desired to extend the service are approached by narrow and tortuous streets, some of which are obstructed by anicent toll bars and others by low railway bridges. Rail traffic on these routes being out of the question, cautious experiments were made with both petrol and battery omnibuses. The petrol vehicles proved unduly costly and troublesome, and the battery vehicles, though more reliable and economical than motor omnibuses, were too slow for satisfactory passenger service.

It was then decided to make an initial installation of railless trolleybuses on a route one and a quarter miles in length, commencing at the Market Square and terminating at Heworth. No severe gradients are encountered, but the service is conducted over some of the narrowest streets of the city, and traverses numerous sharp bends and turns. On account of these conditions the vehicles, which were designed and supplied by Messrs. Railless, Limited, have been constructed to the exceptionally narrow overall width of 6 ft. 3 in., and as they will often be required to deal with very light traffic they have been designed on the "one-man" principle. The entrance door is in front, and under the control of the driver, and fares are dropped into a pay-as-you-enter device. The driver's vestibule is enclosed, and has an entry on the off-side. The cars are of the single-deck type, and have seating capacity for 24 passengers. There are five rows of seats at the back and two rows of seats arranged longitudinally, the off-side seat accommodating 10 passengers and the near side 9.

Each trolleybus is equipped with two 23 B.H.P. motors, arranged for series parallel control, and with two "Railless" patent cam-controlled trolleys, which permit of a very light upward pressure of the trolley wheels against the wires, and allow the cars to deviate at full speed 17 ft. on either side of the centre of the road without risk of de-wiring. Each vehicle is fitted with hand and foot operated service brakes on the rear wheels and emergency foot brakes on the motor shafts.

Four cars have been supplied, but at the outset only two cars at a time are required for service. During the summer a more frequent service will be needed, and a considerable accession of traffic is also expected on completion of the municipal housing project on a site near the outer terminus of the route.

The smooth running, high speed, and rapid acceleration of the "Railless" trolleybuses, and their low working costs, have already made the new service both popular and remunerative.

It is interesting to note that Railless, Limited, have under construction a double-deck "Railless" car of large carrying capacity for dealing with dense traffic. This car will possess many novel features, and will, it is hoped, prove an attractive proposition to authorities faced with the existing financial difficulty of renewing their tramway systems.

LONDON SAFETY FIRST COUNCIL.

ROYAL PRESIDENT'S APPEAL TO MAYORS OF THE KINGDOM.

The fourth annual meeting of the London Safety First Council was held at the Mansion House on February 23, under the presidency of H.R.H. the Duke of York. The large attendance included representatives of municipal and other authorities, tramway and omnibus officials, and several hundred drivers of trains, tramway cars, omnibuses, and commercial vehicles.

STREET ACCIDENTS REDUCED 49 PER CENT.

Mr. H. E. BLAIN, O.B.E., one of the hon. secretaries, moved the adoption of the report. He said that the Council endeavoured by propaganda to interest people in protecting their own lives and limbs. Magnificent work had been done by the Schools Propaganda Committee, and there were 56,000 entries by the children of the metropolis for the essay competition. With regard to the freedom from accidents competition amongst drivers, it was a great thing that in London they had 5,000 to 6,000 drivers a year definitely entering themselves and pledging themselves to exercise care and caution in the streets. Extraordinary success had attended their propaganda by slogans, posters, and other methods. A movement which, in spite of difficult conditions, had reduced the number of accidents by 49 per cent. was one which did not require justification.

Sir H. MAYBURY, director-general of the Roads Department of the Ministry of Transport, in seconding, said the Council desired to see the movement inaugurated in every large city and town.

On the motion of Mr. E. GAUTREY, London County Council, chairman of the committee for promoting the principle of safety first among school children, the Duke of York was re-elected president and thanked for presiding.

The DUKE OF YORK returned thanks for his re-election, and remarked that it was difficult to fill the place of so able a president as the late Lord Downham, but he hoped his shortcomings might be made up for by his enthusiasm for the cause for which they were working. His Royal Highness proceeded—At the commencement of the society's career, I confess I was a little mystified as to what the ubiquitous "Safety First" posters, references, and slogans all meant, but the originality of your propaganda with your hortatory "Do's" and your terrifying "Don'ts" eventually forced my interest, and I realised what a great public need the activities of the Safety First Council supplied. I have since watched the gradual evolutions of the Safety First movement in this country, and more especially in the metropolis. Commencing in the era of the great war, when the instinct for self-preservation by force of circumstances had become highly developed, the application of Safety First principles became second nature, and with the reduced street lighting and increasing dangers to road and foot passengers, the necessity for them became essential. Thanks to the energy and wisdom of your methods during the first three years of the existence of your Council street fatalities diminished in a most remarkable manner. (Applause.)

NEED FOR INCREASED FINANCIAL SUPPORT.

There is every reason for belief that 1920, notwithstanding the great increase of fast-moving traffic in the streets, will show a marked improvement, thanks in no small measure to the publicity which the society has given to its principles. I cannot refrain from expressing my surprise that, in spite of the increased price of everything pertaining to publicity nowadays, you have been able to accomplish so much at so small a cost. To have so popularised safety first on an income of little more than £1,000 a year is truly remarkable, and makes one realise that, with a little more support, much more could be done. If America spends £40,000 a year on safety first propaganda, I think we can afford to substantially increase our expenditure.

PLEA FOR A NATIONAL COUNCIL.

In conclusion, I would reiterate my appeal to the municipal corporations, trading concerns, and road users of the foremost city of the world for their increased support and practical co-operation in this humanitarian task of preventing avoidable casualties. It is a great source of satisfaction to learn that provincial centres are following London's lead, and are contemplating or conducting Safety First campaigns, and so assisting in the consummation of what we all hope will one day take place—a National Safety First Council. In the name of the London Council, I would like to thank the Lord Mayor, whose absence we regret to-day, most cordially for placing the Mansion House at our disposal, and I sincerely hope that the chief magistrates throughout the country will follow his example and, by their patronage, support a movement which is daily becoming national in its importance. (Applause.)

Meritorious service awards were presented by the president to Police-constable H. Dignan, Mr. G. A. Pudney, Mr. W. Jones (railway guard), and Mr. A. A. Scott (omnibus driver). His Royal Highness also handed to ninety drivers (some of whom had not had an accident for 12 years) the prizes won in the freedom from accidents competition.

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RAILLESS TRACTION AT BRADFORD.

MANAGER DESIGNS SIX-WHEELED VEHICLE.

With a view to distributing the weight of railless cars over a larger surface of the roadway, Mr. R. H. Wilkinson, general manager of the Bradford Corporation Tramways, has designed a six-wheeled double-deck railless vehicle. Half the weight of the vehicle is carried by the rear axle and the other half is divided between the two front axles, making a quarter of the weight on each rear wheel and one-eighth of the weight on each front wheel. The addition of the extra pair of front wheels and the distribution of the weight equally on the front and rear wheels makes it possible to allow a space between the front wheels and the front of the vehicle which is very useful for the accommodation of the lifeguard. Owing to the number of wheel contacts with the road surface, the vehicle should run more smoothly.

The seating capacity of the six-wheeled vehicle is 33 on the top deck and 24 on the bottom, making a total of 57. From the roadway to the outside of the roof the height of the car is 14 ft. 7 in., while the distance of the lower saloon floor from the road is 2 ft. 8 in. The height of the inside lower saloon is 5 ft. 10 in., and the inside top saloon 5 ft. 6 in. In width the vehicle body measures 6 ft. 10 in., while the total lengtn is 23 ft. 10 in. The vehicle will be equipped with an electric motor of 60 H.P. capacity, and the drive from the motor to the running axle is effected by means of a gear wheel and chain reduction with differentiation on the back axle.

ONE-MAN SINGLE-DECK RAILLESS VEHICLE.

Bradford Corporation Tramways have received from the Minister of Transport authority to operate their existing railless routes with "one-man" cars, which have been designed by Mr. R. H. Wilkinson. An illustration of the vehicle will be published in an early issue. It will be driven by one tramcar motor of ordinary design mounted on a chassis similar to that of the experimental double-deck top covered railless vehicle which has been in use in Bradford for some time, and was illustrated and described in THE TRAMWAY AND RAILWAY WORLD of November 18, 1920. The one-man car is, however, of lighter construction, as the chassis carries only a single-deck body. The seating capacity is thirty.

The running expenses it is estimated will be between 4d. and 6d. per mile less than those of the double-deck vehicle, and between 7d. and 9d. less than the running expenses of a tramway car. The traffic on the routes on which the railless vehicles at present run is very light, and heavy losses have to be faced. The management therefore find it essential to cut down the expenses in order to maintain the service.

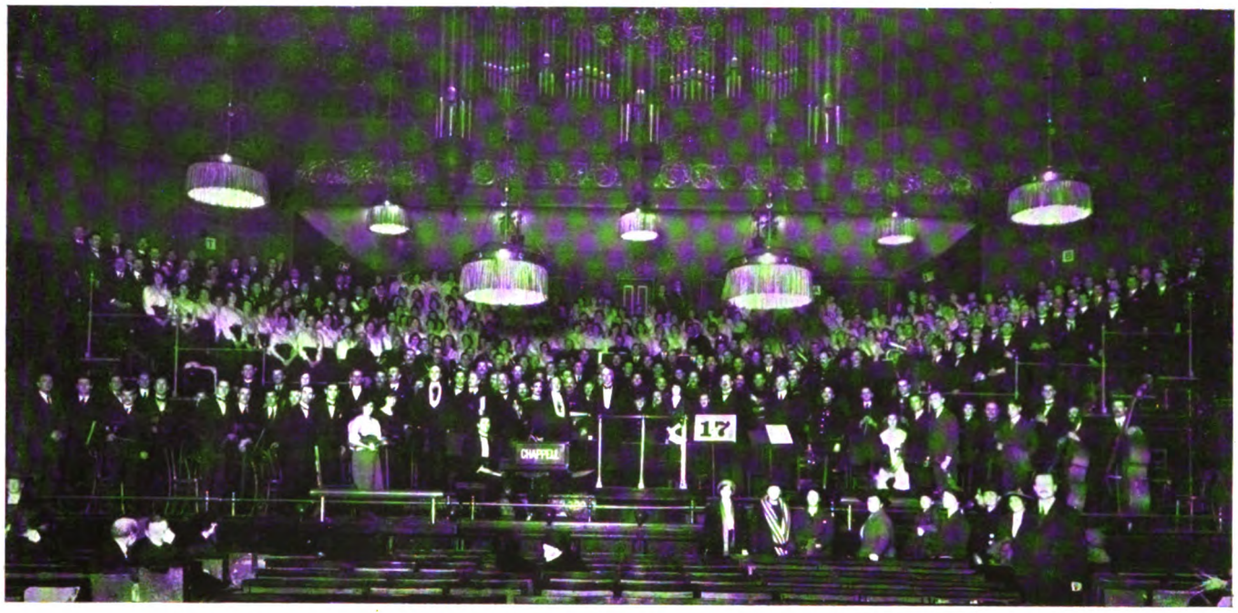
INDICATOR FOR RAILLESS VEHICLES.

Railless vehicles, in common with motor omnibuses, have been more or less stranded in foggy weather, because there are no rails to guide them, as in the case of tramway cars. To overcome this difficulty Mr. Wilkinson has introduced a device on the railless vehicles in Bradford which indicates their position in relation to the trolley wire, and by means of which the motorman is able to maintain the correct direction and position, and thus keep the service in operation, although, of course, time may be lost owing to the fog. The indicator is placed in the driver's cab, and is worked from the trolley. With the indicator before him the driver is able to see exactly how many feet his vehicle is to the right or the left of the overhead wire. By watching the indicator the vehicle can be steered round curves without any other assistance.

T.O.T. PHILHARMONIC SOCIETY.

The last concert of the season was held by the T.O.T. Philharmonic Society at Queen's Hall on February 23. An excellent programme of music was provided, and the combined choir and orchestra, which with the military band numbers well over 300, gave very marked examples of their proficiency, particularly in their presentation of Elgar's "It Comes From the Misty Ages," to quote only one of the works performed. Congratulations are due to the choir, orchestra, and band, and those connected with their training, for the standard of achievement which has been attained. That this opinion was held by the audience was manifest by the lack of empty seats in the hall, and the applause which concluded each item.

The special artistes engaged were Miss Sylva Van Dyck (soprano), Miss May Windsor (entertainer), Mr. C. Knowles (baritone), and Mr. R. Hazell (entertainer), and their efforts were very cordially appreciated, while the work of Mr. J. A. Meale, F.R.C.O., solo organ and musical director, was, as usual, heartily applauded.



Concert of Underground Railway Group of Traffic Workers at Queen's Hall, London.

On the conclusion of the entertainment, and after the singing of the National Anthem, Lady Ashfield presented on behalf of the committee and choir, etc., of the society a gold watch and autograph album containing signatures of the society's members, to Mr. Ewart Beech, the conductor of the combined choir. This presentation was made as a mark of appreciation of his work at rehearsals and in conducting, which had led to the development and continued success of the society.

The audience included a large number of directors and officers of the T.O.T. Companies, with representatives from other systems, of which the following may be mentioned—Underground companies, Lord (and Lady) Ashfield, chairman and managing director; Mr. H. A. Vernet, Col. Sir Herbert Jekyll, Mr. Murray Griffith, directors; Messrs. H. E. Blain, C.B.E., and Frank Pick, assistant managing directors; Z. E. Knapp, director for construction (railways); W. A. Agnew, chief mechanical engineer; A. L. Barber, commercial manager; Mr. A. R. Cooper, chief engineer (railways); Mr. W. S. Every, signal engineer; Mr. C. S. Louch, comptroller and accountant; Mr. G. J. Shave, operating manager (L.G.O.C.); Mr. C. J. Spencer, general manager (tramways); Mr. J. P. Thomas, operating manager (railways); Mr. J. Thornton, superintendent of the line; Mr. S. J. Webb, chief passenger agent. The Great Eastern Railway were represented by Col. W. Johnson Galloway, director, and Mr. A. W. Headley, chief clerk to the chief mechanical engineer (respectively hon. conductor and general secretary, Great Eastern Railway Musical Society); and the London, Brighton and South Coast Railway by Mr. J. Forbes, assistant superintendent of the line.

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REPORT BY THE COURT OF INQUIRY INTO THE DISPUTE IN THE TRAMWAY INDUSTRY.

RECOMMENDATION THAT THE PRESENT WAGE STANDARDS BE MAINTAINED UNTIL 31st DECEMBER, 1921.

To the Right Hon. the Minister of Labour.

We have the honour to report that having been constituted as a Court of Inquiry by the prefixed letter of appointment dated January 5, 1921, we met the representatives of the tramway undertakings and the unions of the employees at Montagu House on January 11, and arrived at an understanding as to procedure. On January 26 the inquiry was formally opened at St. Ermin's, Westminster, S.W.1, and we continued to hold public sittings at intervals until February 18.

2. Before entering upon the cases presented to us by the different parties and their various points of view, it seems desirable to summarise the incidents and proceedings which led to your intervention as Minister of Labour in appointing this Court.

HISTORY OF NEGOTIATIONS ON INDUSTRIAL COUNCIL.

3. The last settlement of the wages position of tramway employees was arrived at by the National Joint Industrial Council for the Tramway Industry by an addition of 5s. to the war bonus from March 29, 1920, and of a further addition of 1s. to the war bonus from June 1. Prior to arriving definitely at this settlement both sides of the Industrial Council obtained a pledge from the Government to introduce a measure enabling the statutory maximum charges applicable to a tramway undertaking to be increased. The Tramways (Temporary Increase of Charges) Act, 1920, resulted. On June 2, certain additions to base rates were agreed upon through the instrumentality of the Industrial Councils. The additions varied from 1s. to 3s., and in a few cases 4s. a week, according to districts, and were dated back to March 29. The result, in the majority of instances, including all previous grants, was a total addition to the pre-war rates of from 40s. to 44s. a week, or in percentages of 130 per cent. to 164 per cent. above pre-war wages, according to grades. The percentage increases were, of course, highest in the cases of the grades and classes who were on the lowest base rates. At the time of this settlement (June, 1920) the cost of living was shown by the Ministry of Labour returns as having increased 150 per cent. since July, 1914.

4. At a meeting of the Industrial Council on October 14, the employees' side put forward a proposal for an immediate general advance upon the current rates of 12s. per week to all tramway employees aged 18 years and over, and of 6s. a week to all youths under 18 years of age, pending the completion of the work of any Standardisation Committee that might be appointed. In pursuance of the proposal put forward at the meeting, a letter, dated October 15, was addressed by the Secretary of the Unions represented on the Council to the Secretary of the Municipal Tramways Association (Incorporated) and to the Secretary of the Conference of Tramway and Light Railway Companies, embodying the terms of the application.

5. A special meeting of the National Council was convened on October 26 to consider the claim. At the meeting the employers' representatives of the company undertakings intimated that, at a meeting of tramway company representatives on October 22, a resolution had been passed to the effect that it was impossible to enter into any negotiations with the Trade Unions represented on the Council, which might result in increased wages being paid to the tramway employees. In view of their inability to negotiate on the matter, the company representatives withdrew from the meeting of the Industrial Council.

6. The employers' representatives of the municipal undertakings discussed the matter with the Trade Union representatives, and it was finally agreed that the Secretary of the Municipal Section of the employers' side and the Secretary of the Trade Union side of the Council should act in collaboration to obtain full information and report upon the following points in connection with the financial position of the Municipal Tramway Industry—

(i.) The increased cost of living compared with the increased wages or bonuses paid to the various classes of tramway employees.

(ii.) A comparison between the wages paid to the various classes of tramway employees and other classes of comparable occupation.

(iii.) The financial position of the various tramway undertakings with the object of ascertaining—

(*a*) The increased cost of operation and

(*b*) The result of the increased charging powers that had been put into force.

7. The report of the two Secretaries, dated November 13 (referred to in the proceedings as the " White Paper "), was submitted to a special meeting of the Council on November 17. The employers' representatives stated that, " having regard to the very serious financial loss as indicated in the report with which tramway authorities were faced, they were unable to accede to the claim submitted for an increase of 12s. per week, or to grant any increase whatever," and they were unable to suggest any alternative to a complete rejection of the claim. After a discussion on the suggestion that the claim might be referred to an *ad hoc* tribunal, it was agreed that both parties should consult their constituents on the question of referring the matter to an independent Court of Arbitration. The companies were not represented at this meeting.

8. A further meeting of the representatives of the municipal undertakings and the Trade Union side of the Joint Industrial Council was held on December 7, when the replies of the undertakings on the question of arbitration were communicated to the Council. The employers' side stated that 89 authorities had been circularised; 39 authorities had replied that they were in favour of submitting the claim to arbitration; 45 authorities had replied that they were against that course; 4 authorities had not replied, and 1 had declined to take any part in the negotiations. The employers' side of the Council was therefore unable to agree to the reference of the claim to an independent Court of Arbitration. The Trade Unions pointed out that the constituents of the Municipal Tramways Association had voted on the question on the basis of one vote to each undertaking, and the employers admitted that, if the replies of the undertakings were tabulated to show the number of workpeople employed, the result would be that the undertakings in favour of arbitration employed a majority of the workpeople engaged in the industry. (During the inquiry it was ascertained that the 39 authorities voting for arbitration employed 29,344 workpeople, and the 45 authorities voting against arbitration employed 15,141 workpeople.) The matter was not discussed further by the Council.

9. In view of the deadlock which had thus arisen, the Minister of Labour took the matter into consideration and convened a special meeting of the Council on December 15, under the Chairmanship of Sir David Shackleton, to discuss the possibilities of a settlement of the difference. The company representatives attended the meeting, and stated that their undertakings could not pay any increase, and they declined arbitration by the Industrial Court or by any other form of tribunal. The representatives of the municipal authorities also intimated that they could not act against the decision of their members. In these circumstances the Minister of Labour decided to set up a Court of Inquiry under Part II. of the Industrial Courts Act, 1919.

PROCEDURE.

10. The case for the employees was put forward by Mr. E. Bevin, of the National Transport Workers' Federation on behalf of the Trade Unions concerned, having representation on the National Joint Industrial Council for the Tramway Industry, supported by Mr. J. Cliff and Mr. H. Clay. The case for the employers was presented by Mr. J. B. Hamilton and Mr. J. McElroy for the municipal authorities owning and operating tramways who are members of the Municipal Tramways Association (Incorporated), with the assistance of Mr. A. R. Fearnley. Mr. A. L. C. Fell, and Mr. J. Beckett. Mr. C. J. Spencer appeared on behalf of the company undertakings, being members of the Conference of Tramway and Light Railway Companies, assisted by the Chairman of the Conference, Mr. C. G. Tegetmeier, and by the Secretary, Mr. A. de Turckheim. Councillor Beaton, Convener of the Aberdeen Corporation Tramways represented the special self-appointed Committee for the Scottish undertakings.

CASE FOR THE EMPLOYEES.

11. The case for the employees' side is that since June, 1920 the average increases over pre-war rates of pay have remained at 130 per cent. to 164 per cent. according to grades. The percentage increase in the cost of living since July, 1914, was 150 per cent, on June 1, 1920, but since that time the figure rose to 176 per cent. in November, and in January it stood at 165 per cent. After the hearing was concluded the Ministry of Labour published the figure for February 1, which is 151 per cent. The percentage advances in wages throughout the war period and since have not moved uniformly with the cost of living figures. The wages application for an increase of 12s. per week to adults and of 6s. per week to youths under 18 years of age, in order to meet the increase in the cost of living which had taken place since the wages settlement of March 29, was put forward as a temporary adjustment, pending the delibera-

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tions of a Standardisation Committee which the employees were anxious to have set up.

12. Family budgets were submitted based upon the household accounts of tramway workers varying from an average weekly expenditure of £3 16s. 7½d. for a family of four to £4 9s. 3d. for a family of seven, as against an average weekly income of £3 18s. 7½d. and £3 13s. 9d. respectively. In support of the budgets submitted, in some cases the wives of the tramway workers concerned, and in other cases the men themselves, gave evidence as to the difficulty they experience in meeting ordinary household and family expenses out of the weekly wage earned including emoluments, and the extent to which they are obliged to supplement their wages. Evidence was given with regard to the nature of the duties of the motormen and conductors, including the spread-over system and the interference it causes in the domestic arrangements of their households. It was shown that undertakings selected their employees very carefully and required a high standard of physique, efficiency and intelligence.

13. Stress was placed on the value of the contribution made by tramway systems to the social and industrial life of the country. The employees criticised the plea put forward by the employers of the inability of tramway undertakings to bear an increase of wages, on the ground that the industry was not being conducted on a sound commercial basis. It was urged that the present method of rating undertakings, the statutory obligations for the maintenance of the surface of the highway, and the charging to them of part of the cost of street improvements, placed on this industry an unfair burden which restricts its full development and contributes largely to the existing unsatisfactory financial condition.

14. In regard to the municipal authorities, the appropriation to the relief of the rates of past profits which accrued in the working of the tramway undertakings was dwelt upon. Witnesses on this subject expressed the opinion that sufficient provision had not been made in the past for future contingencies, and that there was room for the development of the industry as a whole. In expressing these views no aspersion was cast upon the managerial staff of the several undertakings. The employees' side, however, strongly maintained that wages should not be dependent upon the financial condition of an undertaking at a given moment.

CASE FOR THE EMPLOYERS.

15. The total number of tramway undertakings in Great Britain is 162 (of these 65 are companies and 97 local authorities). No application for a wages advance was received in respect of Ireland. The Municipal Tramways Association (Incorporated) represented 79 municipal undertakings in England and Wales, and the Conference of Tramway and Light Railway Companies represented 58 companies in Great Britain. Six of the companies represented by the Conference were in Scotland, and three of these were represented both by the Conference in the general statement made on behalf of their members, and by Special Committee for Scotland.

16. Fourteen undertakings in Scotland (seven companies and seven local authorities) were represented by the Special Committee appointed to prepare and present their case to the Court. A total number of 14 tramway undertakings in Great Britain (11 local authorities and 3 companies) were not represented before us in any way, including the cities of Glasgow and Liverpool, which are not members of the Industrial Council. The employees of the Liverpool Corporation belong to a union not represented on the Council, and their wages have been governed by separate awards and agreements. All the undertakings not represented were circularised by us, and in many cases they furnished the Court with the desired information.

17. The case for the employers was put before us in two separate statements in order to bring to our notice the points of difference between the position of the municipal undertakings on the one hand and of the company-owned undertakings on the other. The case put separately by Scotland included both municipal undertakings and companies.

18. *Municipal Authorities.*—The municipal authorities owning and operating tramways submitted evidence to show that in the year 1913-1914, after meeting operating costs, interest on loans and debt redemption charges usually shown in the net revenue account (including rent of leased lines, etc., but not including any sums put to the renewals fund), 18 out of 75 authorities in England and Wales, for which information was obtained, showed an amount of expenditure in excess of revenue of £145,162, and 57 authorities have an excess of revenue over expenditure of £923,179. For the year 1919-1920, working on this basis, 27 authorities showed a total deficit of £259,202, and 48 authorities had a total surplus of £970,258. The total capital expenditure in respect of these 75 municipal tramway undertakings was £39,968,724 up to the end of the financial year 1913-14 and £42,930,019 up to the end of the financial year 1919-20.

19. These results for 1919-1920, both as regards deficits and surpluses, have arisen without any consideration for renewals and repairs, which, in the case of the undertakings whether of a deficit or of a surplus, are stated to have been altogether under the normal amounts during the war periods. Work undertaken since March 31, 1920 was stated to have been so costly as to absorb many of the surpluses, while those undertakings where deficits were returned have been subsidised from the rates.

20. Notwithstanding the operation of the Tramways (Temporary Increase of Charges) Act, 1920, and the raising of fares by many of the undertakings, the effect, so far as can be judged in the short period that has elapsed, has not been encouraging, the belief being expressed that the economic limit governing the further increase of fares has on the whole been reached, and that the additional expenditure consequent upon the granting of the wages application could only be met by a charge upon the ratepayers. Representatives of municipal authorities who gave evidence expressed the opinion that however anxious their councils might be to consider the application of the men their financial position made it impossible.

The employers did not discuss the family budgets submitted by the employees' side. They accepted the figures indicating the increased cost of living since July, 1914, as published by the Ministry of Labour. They entered upon some comparison between the wages paid to tramway workers and those paid to other more or less comparable classes of workers in other industries, with a view to showing that the former were not in an unfavourable position. The employers were in agreement with the views expressed in regard to the relief of tramway undertakings from the harassing obligations which now rest on them, but they contended that this relief would not alter their immediate financial position.

21. *Companies.*—The case for the companies was presented on behalf of the members of the conference of Tramway and Light Railway Companies collectively. Their position was very similar to that of the municipalities in regard to their inability to meet additional expenditure. The net revenue for 51 companies before allowing for renewals, reserve funds and dividends on preference and ordinary shares, decreased from £512,850 in 1913-14 to £405,785 in 1919-20, whilst in the interval large arrears of renewals and repairs accumulated which must now in some instances be carried on by borrowed money. No material alteration has taken place since the year 1914 in the amount of capital issued. The total capital issued at December 31, 1919, in respect of the 51 companies concerned was £16,565,895.

22. The essential difference between their position and that of the municipal authorities is that the company undertakings are run entirely on ordinary business lines and they are unable to fall back upon the rates for support. The only means by which they can derive increased revenue is by raising fares, and, up to the present, their experience of this method has not been favourable.

THE CASE FOR SCOTLAND.

23. The case on behalf of fourteen of the Scottish tramway undertakings, represented by the special Committee appointed on their behalf, was heard separately. It appeared from the evidence submitted by the Scottish representatives that the position of the Tramway Industry at the present time is probably worse in Scotland than in any other district in Great Britain. Following upon the last wages settlement arrived at by the National Joint Industrial Council, the maximum advance paid by any Scottish undertaking is a total of 42s. per week over pre-war rates. In a number of cases, company undertakings particularly, only a part of the total amount due under previous awards of the National Council is being paid. Their case is that it has been found impossible to meet in full certain of the past awards, and therefore it is impossible to consider the question of granting further increases. It was further represented that the housing conditions in the smaller cities, which led to the concentration of the population in a small area, render it impracticable to derive additional revenue from any further increase in fares. The policy of the Scottish tramway undertakings has been to endeavour to make the rider pay for his ride. Two of the Municipalities (Dundee and Aberdeen) are prevented by Act of Parliament from subsidising the Tramways from the rates, and there are restrictions upon the placing of surplus profits in aid of the rates. In general the municipal tramway undertakings in Scotland appear to have been run on a purely financial basis with the object of giving the tramway users the full benefit of public ownership of the tramway system.

GENERAL REMARKS.

24. Every facility was offered to us by both parties throughout the Inquiry. Comprehensive statements and documents, including the replies to a questionnaire issued at our request, were furnished to us in the course of the proceedings, illustrating the points of the employers' cases as they arose. The case of the employees was most ably and carefully demonstrated by valuable exhibits.

25. We have been deeply impressed by the immense value of the work done by the Industrial Council for the Tramway In-

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dustry in which both parties have participated. Industrial Councils appear to have great possibilities for the betterment of the work-people and the advancement of industries as a whole.

ASPECTS OF TRAMWAY ADMINISTRATION AND MUNICIPAL POLICY.

26. The tramway is of great public utility as an easy, safe and cheap method of conveyance. It enables large numbers of town and city workers of all classes and sexes to live in healthy surroundings and at distances which would be quite impossible on foot. Perhaps there is not any other vehicle capable of carrying the same number of passengers with the expenditure of as little power. It ought to be the study of all Local Authorities to encourage these undertakings.

Much evidence was given as to the relations financially between Municipalities and their tramways. The balance of opinion is much in favour of the passenger paying for his ride and of running the services without subsidy and without handing over surplus profits to the relief of rates; indeed, the two sides of the Industrial Council have agreed that the rider should pay the cost of the ride in the fare charged. Different practices at present prevail and in our opinion municipal authorities should not be deterred or prevented from taking such steps for the development and convenience of the areas over which they exercise control, as they may think essential for the good of the community. We think, therefore, that this matter is one which must be left for local consideration and decision. Of course the companies are not affected by this; their relations are with the passenger only, and their sole remedy is to raise fares. We recognise, however, that a point may be reached when the passenger is paying as high a fare as can reasonably be charged for the services supplied, and any further increase would defeat its own end.

27. In connection with the statements emphasised by both sides as to the desirability of relieving the Tramway Industry from the maintenance of highways and other charges, we feel that a quotation from the conclusions arrived at in this matter contained in the Report from the Select Committee of the House of Commons on Transport (Metropolitan Area), dated July 25, 1919, would not be out of place. It is as follows—

> "Your Committee further consider that it is essential that there should be equal financial treatment of all surface means of locomotion which exists by an appeal to passenger traffic. They regard the rating of the trams and their co-tribution towards the maintenance of the surface of the roads, as compared with the immunity of the omnibuses from both these charges, as indefensible, and there are, in their opinion, no counterbalancing considerations of sufficient magnitude to induce them to modify this view. At the same time, they do not propound any specific means of dealing with this problem, which would be one of the duties entrusted to the suggested Traffic Authority for recommendation to Parliament."

No doubt the Minister of Transport has considered the subject of providing some contribution towards the additional cost of road maintenance caused by very heavy vehicular traffic, which may pass through districts that derive no advantage from it, causing damage to the tramway track, the full cost of which is at present borne by the tramway undertaking.

THE WAGES CLAIM.

28. During the course of the Inquiry we were pleased to see that the reasonable way in which the case of the employees was put forward was met by the representatives of the undertakings in a conciliatory and friendly spirit. There was no belittling of the loyalty and good services of the men of all grades, which were fully appreciated. The issue raised by the employers was inability to pay and the expression of the belief that any further burden would cripple the industry at this trying period when every effort is being made to bring the services into a solvent and efficient condition.

29. We are of opinion that a broad view should be taken of the wages position in this industry. The wages increases have not advanced at the same rate as the cost of living figure since July, 1914, and the application put forward in October, 1920, was intended to compensate for the rise in the cost of living that had taken place since the last wages settlement in March, 1920, and to meet the further increase that was immediately anticipated. Subsequently to October the cost of living figure rose considerably and it has since fallen. We are not in a position to predict its future movements.

RECOMMENDATIONS.

Having carefully considered the statements and evidence so fully and exhaustively brought before us, we submit that in view of the unsatisfactory condition of the industry and under all the existing circumstances, the position and the claim would be met by the following recommendations—

1. That the Industrial Council should examine the position of those undertakings which have not observed previous agreements and arbitration awards in regard to wages advances, and the undertakings should be advised that if possible the advances should be paid in full.
2. That the present wages standard should be maintained both as regards municipalities and companies until December 31, 1921.
3. That the Industrial Council should consider the question of standardisation in the near future, dealing with the various grades of employees in relation to each other, having regard to the earning capacity of the undertakings, and to the interests of the travelling public.
4. That the Council should examine the circumstances of the lower-paid grades with a view to adjusting their conditions on a more satisfactory basis.

30. We trust that this conclusion will commend itself to the two sides of the National Joint Industrial Council if you, Sir, should think it expedient to refer the whole question back to them.

31. We desire to place on record our appreciation of the very efficient manner in which our Secretary has discharged his difficult and onerous duties.

We have the honour to be, Sir,

Your obedient Servants,

DAVID HARREL (*Chairman*).
HARRY GOSLING.
GEORGE H. HUME.
W. FRANK PURDY.
HERBERT B. ROWELL.

H. C. EMMERSON,
Secretary,
February 25, 1921.

CONCLUSION OF THE INQUIRY.

The Court of Inquiry whose report is given above concluded its sittings on February 18. A report of the proceedings on that and the three previous days was given at length in THE TRAMWAY AND RAILWAY WORLD of February 19, but for convenience of reference the following brief summary of that report is here given.

Mr. J. Beckett gave a summary of the replies prepared by the employers he represented to the queries the Court had put forward. He stated that the calculated cost of the proposed increases, in the case of 69 local authorities, would amount to £1,359,835 (excluding Scotland), and that the increase in local rates for 19 towns quoted would range from 1·39d. to 7·18d.

Alderman C. Higham, chairman of the Blackburn Tramways Committee, said the increases would mean a standing charge on the rates.

Mr. W. H. Wale, recently chairman of Coventry Tramways, endorsed this view, and said an increase in fares meant a decrease in passengers and revenue.

Mr. C. D. Johnson, Controller of the London County Council Tramways, gave a *résumé* of their financial position. Referring to the year 1920-21, he said—During the first half of the year we had a deficit of £316,000, and this, together with £18,000 for the previous year, has been raised by a special county rate for the year we are now in. This is the first time we have had to go to the county rate. From October 1 we had an increase in fares, and we hoped that the revenue would balance expenditure. Until a few weeks ago we thought that the hope would be realised, but we found that the work of repairs and renewals would cost more than we had allowed. As far as I can now see we shall be another £200,000 to the bad on March 31, in addition to the £316,000, making a total deficit of £516,000. It looks as if we should be £300,000 to the bad for the whole year.

Mr. C. J. Spencer presented a statement of the case of the company-owned undertakings, and called

Mr. A. de Turckheim, secretary of the Tramways and Light Railways Association, who denied the allegation that the employers had failed to foresee and prevent the present deplorable state of affairs, and said that they had frequently tried to get the Board of Trade and other departments to act.

Mr. A. W. A. Chivers, inspecting officer of the British Electrical Federation, said the investigation into the financial position of every company proved conclusively that they were not in a position to pay increased wages.

Mr. C. J. Spencer, in evidence, speaking for the Metropolitan Electric Tramways, London United Tramways, and South Metropolitan Tramways (of which he is general manager), said they

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declined to grant the increase because they considered the present rate to be relatively correct, compared with other similar occupations, and because their financial position did not allow of such increase. Money was urgently needed for work on the systems.

Mr. E. Hatton, general manager of Newcastle Tramways, contended that Newcastle had done everything which Mr. Bevin advocated as the duty of a self-respecting corporation, and would be faced with a deficit if the proposed increases were conceded.

Mr. J. B. Hamilton addressed the court on behalf of the Municipal Tramways, and said the application now made would entail an additional cost on tramways of £1,186,900. There might be room for difference of opinion with regard to the wage a man ought to get, but on the question of finance they were up against hard facts. There was no room for any doubt upon that point. There was a net loss of £1,555,859 in the last financial year, notwithstanding the unprecedentedly high rate of mileage earnings. With the average earning per car-mile of 27·17d. they had a balance deficit of 3·55d. If they added the cost of the present demand they would get a total loss per car-mile of 5·14d. The annual loss amounted at present approximately to £3,310,753, and if the cost of the present demand were added there was a total of £4,793,597. That represented the actual position of the municipal undertakings to-day. Conditions were not improving, and they were losing many of their regular passengers. Figures had been put before them giving the results of the operation during the last sixteen weeks of the year, and these showed that there had been very considerable reduction. In Leeds, for instance, where the tramways had been one of the most successful undertakings in the country, there was an average loss of £111 a day. Finally, Mr. Hamilton urged that the municipalities believed that the ratepayers were absolutely in accord with their decision to refuse the increase.

Mr. Spencer, addressing the court on behalf of the companies, discussed the answers to the questionnaire which had been addressed to them, and said the net result of the operation of the tramways concerned for the year 1920 was £107,065 worse than in 1914, notwithstanding the fact that the need of money to deal with renewals was much greater now than then. No matter how good the case of the men might be, it was utterly impossible for the companies to contemplate any increase in their expenditure. Having regard to the conditions, the companies submitted that the tramway employees were not receiving a wage below the economic or living level, and that, if anything, the companies were even now paying beyond their capacity.

THE POSITION IN SCOTLAND.

The last day of the inquiry was devoted to the Scottish tramways. They were represented by Councillor D. W. Beaton (Aberdeen), Councillor A. W. Fisher (Perth), Mr. Pilcher (manager, Edinburgh), Mr. Young (manager, Dundee), and Mr. Babb (Musselburgh); Convener A. Malcolm (Dundee) was also present, with others. The companies were not represented.

Councillor Beaton, who represented Aberdeen, Ayr, Dundee, Edinburgh, Leith, Kilmarnock, Kirkcaldy, and Perth, mentioned that the only municipality not represented was Glasgow, which maintained that they had a committee of their own controlling the whole of the wages of their employees. The position of the tramway industry in Scotland at the present time was probably worse than in any other district in the kingdom. After detailing the awards made by the Scottish District Council, he said the result was that there was no margin of profit left out of which it was possible to do more. They asked how it was possible to meet any further increase of wages in view of the fact that it was impossible to meet certain of the past awards? It was practically impossible to earn more by increasing fares, and unless there was some finality to these increases the Scottish tramway undertakings would be driven into bankruptcy.

Questioned by Mr. Gosling, Councillor Beaton could not say that the increases in wages since 1914 met the increased cost of living, but they represented the best that could be done.

Mr. R. S. Pilcher said the Edinburgh Corporation Tramways were in a most serious financial position. They were not paying their way at present, and it was impossible further to increase fares profitably.

This concluded the evidence, and Mr. Ernest Bevin then addressed the court. He recapitulated his arguments, and concluded with an appeal to the court, whose decision, whether for or against the men, he was prepared to accept, to remember that on them depended the well-being of thousands of families.

The President (Sir David Harrel) said the Court would report to the Minister of Labour in due course, and they would give the utmost attention to all that had been put before them. The court was extremely indebted to all the parties for the able way in which their cases had been put forward, and for the assistance they had rendered in helping the Court to discharge the duty entrusted to them.

FINANCIAL REPORTS AND MEETINGS.

Loss on Northampton Tramways.—The Northampton Corporation Tramways show a loss estimated at £8,900 for the financial year ending next month.

City of Buenos Ayres Tramways Company.—The receipts for the year 1920 amounted to £68,940. A final dividend of 1s. 3d. per share, making 5s. per share per annum, less tax, is recommended, £3,000 is allotted to the general amortisation fund, and £3,940 is carried forward.

The British, Foreign, and Colonial Corporation and Messrs. Higginson and Company will shortly offer 3,000,000 eight per cent. first mortgage debenture stock of the Dunlop Rubber Company at the price of 98 per cent. The stock will be repayable at 105 by annual drawings from 1928 to 1940. The minimum yield, including redemption, amounts to £8 7s. 8d.

Tramways Light and Power Company.—The report shows—Profit for 1920, £53,697, and £3,833 was brought in, making £57,530. Loan on debenture interest and redemption, £21,979; to reserve, £5,000; dividend on ordinary for year of 6 per cent., less tax; forward, £2,266. Early last year an issue of £247,900 in ordinary shares was made, and it was intended to make a further issue at a later date to deal with the balance of expenditure on extensions, but owing to financial and trade conditions this was not possible. For the purpose of repaying bank loans, etc., £375,000 five-year secured notes were created, of which £200,000 have been issued since closing the present accounts.

Tyneside Tramways and Tramroad Company.—The report for the year ended December 31, 1920, shows a profit of £3,340. The balance brought forward amounted to £1,010, and there is thus a credit of £4,350. After deducting interest on mortgage loans, £1,253, the available balance is £3,097. The directors recommend the following appropriation—Dividends on preference shares at the rate of 5 per cent. (less income-tax), £601; ordinary shares at the rate of 3 per cent. (less income-tax), making with the dividend paid in September 4 per cent. for the whole year, £2,008, leaving a balance of £488 to be carried forward. The traffic receipts show an increase of £2,051 as compared with the corresponding half-year of 1919. On the whole year there was an increase of £6,579.

Glasgow Tramways Finance.—After a long and acrimonious discussion, Glasgow Town Council, at its meeting on February 3, refused to make a grant of £10,000 to the Special Committee on Unemployment. In a communication from the City Chamberlain it was stated that there might be a shortage in the Common Good account of about £100,000, owing to the fact that the tramway undertaking would probably not have any surplus revenue to pay that fund. Councillor Kelly said that the tramway system was worth not less than £4,000,000 of capital, but unfortunately during the last financial year costs and wages were so high that the revenue was not sufficient to meet them, and the year finished with a very large debit balance. He considered that the tramways would not be run in a proper financial position until they were able to return 5 per cent. on the capital sum.

Mansfield Tramways.—At the annual general meeting of the Mansfield and District Tramways, Limited, Mr. A. B. Holland (chairman) said the net profit available was £6,000 more than last year, and the amount had been placed to reserve. Capital expenditure had been incurred in doubling the track on the Sutton route and in the acquisition of motor vehicles. To provide for this capital expenditure an issue of £40,000 eight per cent. seven-year notes had been arranged. The company had received an order from the Transport Ministry enabling it to increase its fares, a step necessary to meet the great rise in wages and other operating costs A final dividend on the ordinary shares of 6 per cent. was declared, making with the interim dividend already paid 9 per cent. for the year. An extraordinary general meeting followed for the purpose of increasing the capital by the creation of 50,000 additional ordinary shares of £1 each to provide for future developments.

Cardiff Tramway Estimates.—The estimates for the Cardiff Tramways for the year ending March 31, 1922, were presented at a meeting of the Electric Lighting and Tramways Committee, at which Mr. Sidney Jenkins presided. The chief figures in the tramway estimates were—

	Actual.	Estimated. 1921.	Estimated. 1922.
	£	£	£
Traffic expenses	110,748	125,775	139,750
General expenses	14,170	17,100	21,885
Power expenses	51,186	59,850	93,500
Repairs and maintenance ...	37,626	36,300	49,125
Special items	35,167	21,868	24,803
Total (including loan charges)	290,773	307,001	381,077
Total income	328,959	323,567	379,887
Estimated deficit	38,186	16,585	1,590

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TRAMWAY AND LIGHT RAILWAY NOTES.

BELFAST.

TRACK RECONSTRUCTION—HIGHER FARES.

The Chairman of the Belfast Corporation Tramway Committee has informed the City Council that the scheme for the repair of the tramway track will eventually involve an expenditure of £1,215,000. The work consists of the reconstruction of 58 miles of single track, the total single track mileage in the city being 100 miles. It is proposed to spread the work of reconstruction over a period of five years. Mr. J. S. D. Moffat (general manager) has strongly recommended that the work should be done by contract. The committee, he points out, has neither the organisation or the special plant for carrying out the work with the speed that is necessary. An amendment proposed by the Labour members in favour of direct contract work has resulted, however, in the question being referred back to the Tramways Committee for reconsideration. The Ministry of Transport has sanctioned increased fares on the Belfast Corporation Tramways. The minimum fare is increased from 1d. to 1½d.

BIRMINGHAM.

RAILLESS CARS RECOMMENDED—TRACK RECONSTRUCTION.

The Tramways Committee of the Birmingham City Council had before them, on February 15, a report by the general manager (Mr. Alfred Baker) on the railless trolley cars which are in use at Bradford. Recently members of the committee, with the Lord Mayor and the chairman of the Public Works Committee, visited Bradford to inspect the system, and they returned much impressed by the improvements recently effected. Larger cars are now in use, and greater mobility has been obtained. The committee regard the system as eminently suitable for some of the Birmingham routes on which the traffic is not very heavy. The committee's experts have in view a modification of the Bradford system, which will, it is believed, add to its usefulness in Birmingham. The City Council's sanction has now been given for a route running to one of the industrial districts, and it is hoped that it may be possible to have the service running in about twelve months. The reconstruction of the tramway permanent way which is being undertaken at Birmingham will involve an estimated cost of about £70,000.

BOURNEMOUTH.

DELIVERY OF NEW CARS.

At a meeting of Bournemouth Tramways Committee the general manager reported that he was expecting to receive five new cars by Easter, and after that delivery at the rate of two a week, so that the whole delivery might be expected to be complete by Whitsuntide.

BRADFORD.

RAILLESS EXTENSION DELAYED—REPORT OF ACCIDENT.

The Ministry of Transport has refused the application of the Bradford Corporation for powers to extend the railless traction system on the city tramways, the Minister having informed the general manager (Mr. R. H. Wilkinson) that he has "no power to authorise the running on the routes in question of trackless trolley vehicles of the weight proposed." The report of Major Hall, Inspector of the Ministry of Transport, who inquired into the accident that occurred on February 3, has been received by the Bradford Tramways Department.

BRISTOL.

CORPORATION'S OPTION TO PURCHASE TRAMWAYS.

At the meeting of the Bristol City Council on February 8 it was stated that the option of the Corporation to purchase the undertaking of the Bristol Tramways Company arose on May 1, 1922, and was available for six months. If not then exercised the option would recur at every subsequent period of seven years from May 1, 1922. The Tramways Option Committee, it was stated, had not yet considered the desirability of exercising the option, but they would give ample time to the consideration of the matter.

CARDIFF.

MORE OMNIBUSES TO BE ORDERED—WHAT STRIKES COST.

The Cardiff Tramways Committee, which recently obtained six motor omnibuses from Stevens Petrol Electric Vehicles, Limited, of 82, Victoria Street, London, S.W., are now considering the purchase of additional omnibuses. At a recent meeting of the tramways committee, Mr. Sidney Jenkins, chairman, said that information had reached him privately which made it necessary for the Council to formulate its policy as to the future of their motor omnibus service without delay. He thought that 25 to 30 additional omnibuses would be necessary. The two Cardiff tramway strikes last year made a difference in the accounts of £7,141. This is the interesting fact disclosed by the revenue accounts of the Corporation tramways for the nine months ending December 31 last. Had there been no strikes, says the report, the excess of income over expenditure would have been £2,494 instead of a loss of £4,647.

DOVER.

LOSS ON THE TRAMWAYS.

It is estimated that there will be a loss of over £11,000 on the Dover Corporation Tramways in the next financial year, including an expenditure of £5,800 on the permanent way. Such a loss will entail a rate of over 14d. The anticipated deficit is £5,000 more than the loss during the previous year, and some members of the Town Council have expressed the view that it would be better to discontinue the service than to continue such heavy losses. The majority of the Council, however, recognise the immense convenience of the tramways to the public, and advocate an increase in fares rather than the discontinuance of the service. The main troubles are the great increase in wages and the high cost of power. The Corporation purchases its current at the price of 6d. per unit, which the manager recently reported was more than the rate paid by any other tramway in the country. The Dover electricity works, however, are run at a serious loss, and the tramways have consequently to pay a heavy subsidy to the electricity department. At the last meeting of the tramways committee a resolution of appreciation of the work of the manager and the staff was passed. Councillor Barwick, chairman of the committee, said that everyone had done their best in difficult circumstances, and deserved encouragement.

EDINBURGH.

SEASON TICKETS NOT TO BE ISSUED—ELECTRIFICATION.

The Tramways Committee, following a report from Mr. R. S. Pilcher (general manager) has decided to make no recommendation on the question of issuing "seasons" on the city tramways. Mr. Pilcher said all experience had shown that season tickets were only taken out by those who would save money. They were subject to abuse, difficult to check, and had been abolished in practically all the places where the experiment had been tried. The manager is preparing a report of the whole question of the electrification of the Edinburgh tramways, and action on the matter has been deferred by the tramways committee pending the completion of the report. Details of receipts from motor omnibuses over routes where cable cars had formerly been used are contained in a report presented by the manager to the tramways committee. On the Goldenacre-Mound route it was shown that, comparing six weeks of the cable cars last year with the corresponding past six weeks, there had been an increase in the number of passengers carried of 53,519. There had also been a decrease in the mileage run of 4,445. The increase in receipts amounted to £846, which represented, according to the tramways manager, an increase of 8·9d. per car-mile. Taking all the northern routes for the past three weeks, and making a comparison with the corresponding three weeks of last year, when cable cars were running, the returns showed an increase in the number of passengers carried of 61,769, an increase in mileage covered of 7,750, and an increase in receipts of £1,163, representing an increase of 2·2d. per car-mile.

GLASGOW.

OMNIBUS OR TROLLEY CARS—ALL-NIGHT CARS.

The tramways committee of the Glasgow Corporation are considering the best means of extending traffic services, and have arranged to send a deputation to Leeds and Bradford to investigate the railless trolley system. Consideration is also being given to a suggestion that power should be obtained for the running of motor omnibuses to link up or extend services. The tramway manager reports that to run omnibuses through the centre of the city would be a mistake, as this would only add to the present congestion. The Corporation, having approved the recommendation of the tramways committee to institute all-night cars on the tramways, the services were begun on the night of Sunday, February 6, some fifteen cars being used for the various routes selected. The cars leave the starting points at intervals of an hour from 12.30 to 3.30 a.m. The service will continue only until May 31, and will not be in operation on Sunday mornings.

HALIFAX.

TRAMWAY MANAGERSHIP.

In reply to advertisements Halifax Corporation received twenty-six applications for the post of general manager of the tramways for which the salary is £900 per annum. The tramways sub-committee reduced the list of applicants to six, who were interviewed by the full committee. These six were Alfred Baker, chief engineer, Birmingham Corporation Tramways; John Steven Hamilton, chief assistant engineer, Leeds City Tramways; Ben Hall, general manager and engineer, Wigan Corporation Tramways; J. W. Galloway, tramways engineer, Halifax Corporation; Frederick Andrew Fitz Payne, deputy tramways manager, Edinburgh Corporation Tramways; and T. G. Richardson, general manager and engineer, West Hartlepool Corporation Tramways. After interviews the committee decided to appoint either Mr. Hall or Mr. Galloway, but before deciding they proposed to visit Wigan.

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LINCOLN.

SUNDAY SERVICES REJECTED.

Lincoln City Council has rejected a proposal to run the tramway cars on Sunday. A deputation of local clergy protested on the ground that the church services would be disturbed by the noise.

LIVERPOOL.

NEW TRAMWAY ON SLEEPER SYSTEM—IMPROVEMENTS AT PIER HEAD TERMINUS.

The Corporation have approved the recommendation of the tramways committee that a new tramway be laid on the sleeper system in Prince's Road alongside the boulevard, at an estimated cost of £24,057. The scheme was recommended by Mr. John A. Brodie, city engineer, who is responsible for the tramway permanent way. Improvements at the Pier Head terminus at Liverpool are approaching completion. The *Liverpool Daily Post* says that with reasonable good fortune it is expected that the completion of the work of laying down the lines in three big circles between the floating bridge and the bottom of Brunswick Street will be completed in three or four months. The work has been carried out in accordance with designs prepared by Mr. C. W. Mallins, the late general manager, some time before he retired. The system is being adopted to avoid congestion at the Pier Head, Liverpool. By the operation of a series of three loops cars will, in the event of a breakdown on any one of these loops, be diverted to the others, while all cars will be able to return by the route along which they have arrived.

LONDON.

THROUGH FARES ON CARS AND OMNIBUSES.

Through tramcar and omnibus tickets, via Victoria Station, came into operation on February 17, under the new agreement between the London County Council and the London General Omnibus Company. The scheme provides for both the Council and the company to issue through tickets, via Victoria, at fares of 2d., 3d., 4d., and 5d., based on the addition of 1d. to the tramway fares of 1d., 2d., 3d., and 4d., from Victoria, the company to convey through passengers by any omnibus for a 1½d. stage from Victoria. Certain of the omnibuses have been diverted from Victoria Station yard so as to facilitate the interchange of passengers, and early morning omnibuses are provided to connect with the Council's workmen's cars. Through tickets, however, are not issued in connection with either workmen's fares or the 2d. midday fare.

MANCHESTER.

EXPRESS TRAMCARS.

The Manchester Town Planning Committee has decided that the construction of a new main road from West Point, in the Levenshulme district, should be begun in a few days. The road is to be 100 feet wide, and is to be one of several boulevards that are contemplated in the city's town planning schemes. It is to be planted with trees on each side, and eventually to be traversed by an express service of tramcars.

NORTH KENT.

BEXLEY, DARTFORD, AND ERITH TRAMWAYS.

The Ministry of Transport has made a proposal that a conference should take place with a view to arrangements being made for the London County Council to take over the tramways owned by the Bexley, Dartford, and Erith Urban Councils. Erith and Bexley Councils both work their systems at a loss, and the agreement of the Dartford Council with the Bexley Council for working their system comes to an end in March. Owing to the fire in 1916, Dartford is without a depot and tramcars. An inquiry was held recently into an application to borrow over £80,000 for putting the Dartford system into running order again, as a separate undertaking.

PONTYPRIDD.

QUESTION OF SUNDAY CARS.

The Clerk of Pontypridd Council has reported to the Council that he is advised that there was no legal power to incur expenditure in taking a poll on the question of the running of cars on Sunday. The Council resolved to defer a decision until a new offer in favour of a flat rate for the running of cars by Rhondda Tramways Company on Sunday to Pontypridd was received.

PORTSMOUTH.

SHORT TIME ON THE TRAMWAYS.

Short time on the Portsmouth Corporation Tramways came into operation on February 28 as an alternative to the discharge of men on the curtailment of the service, which in future is to be one of six minutes instead of five. It is hoped that this step with increased fares that are being charged will again make the undertaking a paying concern. The men will work one hour less on each weekday, or six hours less on the week, the average loss of wage being 9s. 3d. per week. It was calculated that by a six minutes' service instead of five £10,000 a year will be saved if 45 men were dismissed. To avoid the latter the short time arrangement was decided upon.

SOUTHAMPTON.

PRESENTATION TO AN ALERT MOTORMAN.

Alderman F. A. Dunsford (chairman of the Southampton Tramways Committee) on February 28 presented a handsome marble clock to Motorman P. Wrixon, in appreciation of his conduct in saving a little boy's life. In making the presentation the Alderman read a letter which was sent with the clock from the parents of the boy, in which, in expressing their heartfelt thanks, they said they were assured by several persons who witnessed the accident that it was entirely due to the presence of mind and coolness of Motorman Wrixon in stopping the car that the life of the child was saved. Alderman Dunsford said that it was very rare indeed that the appreciation of the public was shown in such tangible form. The percentage of accidents in Southampton in connection with the tramways was comparatively very small. Mr. J. Dobson (general manager) said that Motorman Wrixon well merited the recognition. As a quarter of a million people were carried on the cars every week the accidents were surprisingly few, and he was sure that the action of Motorman Wrixon would be a standing example to every other man on the job.

TORQUAY.

ELECTRICITY AWARD.

The arbitrators in the dispute between the Town Council and the Torquay Tramway Company regarding the price of power current has awarded a penny increase per unit, or 2⅝d. up to half a million units, and after that a drop to 2½d. per unit. The award is based on the price of coal at 55s. per ton, and in the event of a fall in price there is to be a revision of the charge. The award is retrospective to April last. The cost of energy is at present 1⅝d. per unit, and in consequence of the greatly increased price of coal, etc., the local authority asked for 3⅓d. per unit.

WALTHAMSTOW.

MANAGER RECOMMENDS OMNIBUSES.

In his last annual report the tramways manager of Walthamstow (Mr. William Murray) recalls his repeated advice with regard to the acquisition of motor omnibuses, and expresses the hope that definite action will be taken this year. The growth of the town will make further travelling facilities imperatively necessary, and an omnibus service, he says, would be invaluable to the tramways as an auxiliary during rush hours and a public convenience during track reconstruction. It would also enable outlying districts to be served.

PERSONAL.

Lord Ashfield has joined the board of the United Railways of the Havana and Regla Warehouses, Limited.

Mr. J. H. B. Noble has been elected vice-chairman of Sir W. G. Armstrong, Whitworth and Company, Limited.

Mr. Walter Rutherford has resigned from the board and management of the English Electric Company, and Mr. P. J. Pybus, joint managing director, has been appointed managing director.

Ministry of Transport Resignations.—Sir Alex Gibb, Mr. T. G. Menzies, Mr. John Ferguson, and Mr. Guy Maunsell, who have been associated with the engineering staff of the Ministry of Transport, have resigned.

Sir Thomas Williams, late general manager of the London and North-Western Railway, has been appointed by the Minister of Transport a member of the committee set up to inquire into the running by the railway companies of road services for goods traffic.

Councillor W. G. Turner was on February 7 re-elected chairman of Belfast Tramways Committee for the year 1921-22. In returning thanks he remarked that the past year had involved consideration of such important matters as track reconstruction, increased fares, and improved facilities. Councillor Anderson was re-elected vice-chairman.

Mr. A. G. M. Jack, C.B.E., who has been deputy chairman of Messrs. Hadfields, Limited, for many years, and is now retiring from that position, has been presented by the commercial, technical, and drawing office staff of the Hecla and East Hecla Works with a solid silver tea service. Other gifts included an oak timepiecee and three silver cake stands. Mr. W. E. Parker, O.B.E., presided at the presentation, and was supported by Sir Robert Hadfield and other directors and officials of the firm.

Sir Eric Geddes.—Sir Eric Geddes will resign his office of Minister of Transport in August, and will, it is understood, accept an important position connected with the transport industry, but not a railway position. It is rumoured that the Cabinet have not accepted his plans for the future of the railways, and that the Government will as soon as possible relinquish the control of the railways, which will then revert to the companies. Sir Eric has authorised the following statement—"Rumours have appeared in certain newspapers that in the near future I may renew my connection with British railways. Having regard to my duties and responsibilities as Minister of Transport, I would consider that such an arrangement would be highly improper. There is absolutely no shadow of foundation for the suggestion."

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CONTRACTS AND ORDERS.

W. T. Henley's Telegraph Works Company have received a contract from Leeds Corporation for electric cables at £3,385.

J. W. Courtenay, Limited, of Amberley House, Norfolk Street, London, W.C., have been appointed sole advertising contractors to Dundee Corporation Tramways.

Richard Garrett and Company, Limited, are to supply to the Calcutta Municipal Council through the Associated British Engineers, Limited, two 3½-ton end-tipping electric lorries.

Hackney Borough Council has been recommended by the Works Committee to purchase five petrol 6-ton wagons with hydraulic tipping gear from Leyland Motors, Limited, at £1,550 each.

The Director of Army Contracts has accepted the tender of the English Electric and Siemens Supplies, Limited, for approximately 100,000 metal filament lamps of the vacuum gas-filled type.

The English Electric and Siemens Supplies, Limited, of Brook House, 191, Tottenham Court Road, W.1, have received acceptance of their tender to the London County Council for 100,000 metal filament lamps.

The Francaise Thomson-Houston Compagnie, of Paris, in conjunction with the General Electric Company of America, have obtained the contract for plant and material required for the electrification of the Pajares incline on the Norte Railway between Gijon and Leon, Spain.—*The Manchester Guardian.*

British Tenders in Australia.—The Australian Overseas Committee of the British Electrical Manufacturers' Association have protested against Sydney City Council accepting the tender of an Australian firm at a price 20 per cent. higher than that of British firms. The association states that the duty, freight, insurance, exchange, and other charges afford Australian firms a protection of 45 per cent. Thus the total burden on British manufacturers in this instance is 65 per cent. It is urged that no preference should be given to local firms over British goods.

Glasgow Corporation Tramways Sub-Committee recommend that the following offers be accepted—Lead-covered cable, Western Electric Company, Limited; picks and shafts, J. Yates and Company, Limited; Presspahn paper, J. M'Lennan and Company; timber, Slater, Birds and Company, Brownlie and Company, Limited; leather, A. Muirhead and Son, Barrowfield Leather Company; whistles, J. Hudson and Company; plate for 40-ton weighbridge, W. and T. Avery, Limited; copper strip, C. Henderson and Company, Limited; brass tubing, P. and W. M'Lellan, Limited; chemical and tarpaulin covers, J. M'Ilwraith and Company, Limited; J. A. Shepherd and Company, Limited, M'Harg Brothers; calico for destination screens, A. Brand and Company.

BELGIAN RAILS FOR WARRINGTON.

Warrington Corporation has accepted the recommendation of the Tramways Committee that a tender for steel rails should be placed with the Anglo-Belgian Improvements Corporation. At a meeting of the Town Council, Councillor Broadhurst, in opposing the recommendation, said that he was one of the representatives of St. Annes' Ward, where there are a number of iron and steel works, and he felt he could not support the resolution while there were hundreds of steel furnaces lying idle. They knew that Belgium produced very little steel, but much came from Germany through Belgium, and he would not be surprised if that were so in this case. It was impossible to produce steel at that price in England with the wages now being paid. If a British firm were going to compete, the manufacturer would have to reduce his selling price, and this would mean a reduction in the iron and steel workers' wages.

Sir Peter Peacock, chairman of the Electricity and Tramways Committee, in reply, said that the tender was just £400 lower than the others, but even with that the committee were reluctant to send the order abroad. In the circumstances, however, they felt compelled to do so, not only because it was cheaper, but because they could get delivery almost immediately, whereas other firms could give no guarantee, nor would they supply the sections which were necessary. The committee debated the matter keenly, but as the other firms would not give them what they wanted, they thought they would not be acting wisely if they rejected the Belgian tender. The recommendation of the committee was accepted by a large majority.

District Railway's Ealing Express.—The Ealing Express of the District Railway has proved so popular that it has become necessary to increase the length of this train from six to eight cars. The express leaves the Mansion House at 5.7 p.m., and from Sloan Square runs non-stop to Acton Town. The complete journey from the Mansion House to Ealing is made in 30 minutes.

BUSINESS NOTICES.

JOHNSON AND PHILLIPS, LIMITED, have opened a branch office at 1, Nelson Street, Bristol (telephone number 2499). A stock of cables, wires, and accessories will be carried at the new branch.

THE BRITISH THOMSON-HOUSTON COMPANY have issued a pamphlet treating of the design and manufacture of their rotary converters. Useful technical details are given, and the pamphlet is of general interest.

SCHOLEY AND COMPANY, LIMITED, have transferred their head office from 56 Victoria Street Westminster, to their works at Croydon. Their address is now Victory Works, Gloucester Road, Croydon (telephone number, Croydon 2164).

THE BRITISH ALUMINIUM COMPANY, LIMITED, 109, Queen Victoria Street, E.C.4, have recently issued a pamphlet giving particulars of some of the more novel uses of aluminium. Aluminium is now used extensively for tramway feeders and electric cables, overhead conductor dynamo wires, field coils, etc.

BRILL TRUCK PARTS.—We are informed that tramway managers interested in the new stock of Brill truck parts illustrated in the J. G. Brill Company's advertisement in our issue of February 17, can obtain for reference purposes in the depot an enlarged reproduction of that advertisement mounted on stiff board, on application to the company's offices at 150, Southampton Row, London, W.C.1.

THE PECKHAM TRUCK AND ENGINEERING COMPANY, LIMITED, of 26-29, Audrey House, Ely House, London, E.C.1, have been appointed by Messrs. Brecknell, Munro and Rogers, Limited, sole selling agents for their traction and electrical departments. Messrs. Brecknell, Munroe and Rogers have extended their premises in order to develop these departments, and Mr. A. M. Willis has been appointed manager of the traction department. The Peckham Truck and Engineering Company, in addition to acting as the sole selling agents for Messrs. Brecknell, Munroe and Rogers, will continue to carry on business in their own specialities, including pendulum geared single, maximum traction, and bogie type trucks; Thomas "non-automatic" brake adjuster, Eureka track brakes, Rayner "kleen-car" seats, and Thomas ratchet locking device, together with all tramway and railway truck spare parts.

TRACK RECONSTRUCTION AT BRADFORD.—The Tramways Committee of the Bradford Corporation has recommended the reconstruction of tramway track as follows:—Great Horton section, from All Saints' Road to Union Road, £14,175; from Hunt Yard to Southfield Lane, £6,199; Horton Park Avenue Section, from Laisteridge Lane to Little Horton Lane, £7,405; and Wakefield Road section, from Croft Street to Broom Street, £3,405, a total of £31,184.

W. Sansome Davis

MANUFACTURER OF

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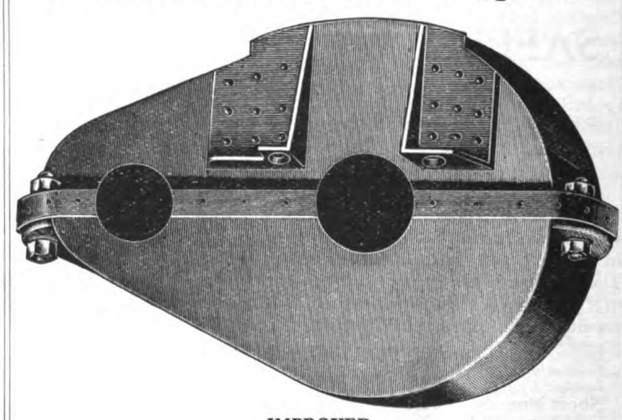

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London United Tramways
Metropolitan Electric Tramways
Preston Corporation Tramways
Halifax Corporation Tramways
Ipswich Corporation Tramways
Gosport and Fareham Tramways
Southport Corporation Tramways
Birmingham Railway Carriage and Wagon Co. Ltd.
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PATENT LIST

Abstracted for "The Tramway and Railway World" from the Official Journal of Patents.

***** If the inventions have been communicated the names of the communicators are given in italics.**

APPLICATIONS FOR LETTERS PATENT.

The number of the patent is given in brackets.

Spring suspensions for motor vehicles (3,797)—A. W. Gattie.
Device to prevent mud splashing and skidding by motor vehicles (3,990)—W. T. Nickless.
Brake mechanism for motor cars (4,103)—Soc. des Aeroplanes H. and M. Farman.
Motor vehicles (3,850)—E. Tatschke.
Travelling platform for termini of electric tramway systems (3,907) C. R. Thompson.
Driving mechanism of motor vehicles (3,952)—Variable Speed Gear, Limited.
Emergency brakes for vehicles (4,138)—N. E. Willis.
Motor vehicles (4,039)—W. Wright and others.
Pulleys for trolley poles of electric tramcars (4,446)—G. A. Bishop and R. A. Chadwick.
Direction and movement indicators for road vehicles (4,949)—F. Calvert and J. T. Yeoman.
Emergency brakes for motor vehicles (4,451)—G. Cooper.
Safety skids for motor vehicles (4,973)—G. Dawkins, L. Dawkins and P. Williams.
Brakes for vehicles (4,711)—G. Fornaca.
Automatically controlled variable speed gear (4,601)—H. J. Law.
Change speed gear for motor vehicles (4,385)—A. R. Mitchell.
Trolley pole attachments for electric trams (4,325)—P. Priestly.
Life guard for front of motor vehicles (4,582)—T. W. Robertson.
Arrangement for recovery of energy in electric railway systems employing series-connected direct current motors (4,761)—E. Santuari.
Apparatus for collecting electric current for electrically propelled vehicles by means of carbon brushes (4,394)—Soc. Anon le Carbone.
Steering wheels for motor vehicles (4,624)—W. J. Thomas, F. G. Woollard and E. G. Wrigley and Company Limited.
Self-propelled road vehicles (4,597)—V. A. Trier.
Life guards for vehicles (4,501)—T. Wake.
Steering indicating means for railless cars, etc. (4,684)—R. H. Wilkinson.
Motor gear lock for petrol-driven vehicles (5,076)—W. R. Berry.
Chassis for motor cars (5,421)—J. R. Churchill.
Emergency brake (5,550)—T. H. Griffiths.
Shock absorber for motor vehicles (5,634)—W. H. John.
Steering gear for motor vehicles (5,502)—H. Marles.
Trolley wheels for electric tramcars (5,713)—E. Nightingale.
Control mechanism of motor vehicles (5,722)—A. and J. Northedge.
Seat for tramcar (5,155)—F. de Sales.
Non-skid device for road vehicles (5,295)—A. Sugden.
Levers, etc., for operating tramway switches (5,086)—O. R. Williams.
Wheels and resilient tires (6,306)—W. Alderson and F. B. Bowyer.
Lighting devices for motor vehicles (6,119)—Benjamin Electric, Ltd.
Means for actuating repeater signals on locomotives of electric railways (6,161)—J. Bethenod.
Traffic direction indicator (6,495)—G. Blake and L. Brooks.
Appliance for indicating location of faults in section feeder boxes of overhead wire systems of electric traction (6,040)—Brecknell, Munro and Rogers, Limited, and F. W. Brecknell.
Driving gear for motor vehicles (6,455)—R. A. P. Bridges.
Electric storage battery or accumulator cells (6,137)—Chloride Electrical Storage Company, Limited, and B. Heap.
Power transmission means for motor vehicles (5,895)—W. Cochrane.
Life-guard for motor vehicles (5,870)—A. P. Collen.
Weather screens for drivers on tramcars (5,966)—E. E. Daglish, W. L. Lorkin, and A. A. Blackburn.

SPECIFICATIONS PUBLISHED

1914.

Control apparatus for multiple speed gear (8,327)—Payne and Bristol Tramways and Carriage Company, Limited.

1919.

Electric traction systems having one or more conductor rails (24,470—*157,516*)—R. Pattison.
Anti-creep devices or anchors for rails (24,889—*157,526*)—H. Yates.
Liquid fuel supply for motor vehicles (26,070—*157,566*)—S. S. Guy.
Lifting jack (26,697—*157,577*)—H. Queney.
Construction of frame or chassis for motor road vehicles (27,201—*157,590*)—Alldays and Onions, Limited, and A. W. Reeves.
Devices or apparatus for jacking-up motor road vehicles (25,874—*158,049*)—A. Delo-Ford.
Power transmission devices for self-propelled vehicles (26,226—*158,074*)—F. T. Skippins.
Mechanically propelled vehicles (26,389—*158,089*)—H. Stanbridge.

1920.

Brake mechanisms for motor vehicles (4,082—*138,903*)—C. W. Parker.
Hydraulic jack for automobiles (10,822—*142,094*)—L. Duverne.
Power transmitting means for motor vehicles (18,688—*146,826*)—J. B. Entz.
Fluid brake for motor vehicles (9,459—*158,168*)—F. G. Hultenheim.

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TRAFFIC RETURNS.

Tramway and Omnibus Undertakings in the United Kingdom.

NAME OF COMPANY OR CORPORATION.	1920. WEEKS ENDED					1921. WEEKS ENDED					AGGREGATE.		
	Feb. 7	Feb. 14	Feb. 21	Feb. 28		Feb. 5	Feb. 12	Feb. 19	Feb. 26		Wks.	1921.	Increase or Decrease.
	£	£	£	£	£	£	£	£	£	£		£	£
Aberdare Corporation	620	590	...	...	...	575	492	...	...	...	45	28,368	+ 2,949
Aberdeen Corporation	3,013	3,038	2,988	2,970	...	3,497	3,421	3,480	3,382	...	38½	148,473	+ 23,293
Ayr Corporation	469	488	454	472	...	549	537	548	539	...	41	31,649	+ 3,213
Barrow Corporation	712	744	734	744	...	892	854	862	848	...	46	42,489	+ 6,808
Belfast City Tramways	10,608	10,828	10,761	10,723	...	11,490	10,902	11,156	11,168	...	48	547,053	+ 51,346
Birkenhead Corporation	2,987	3,003	3,078	3,004	...	2,950	2,879	2,939	2,977	...	47½	155,918	+ 15,735
Birmingham Corporation	26,997	27,254	26,940	26,885	...	32,993	31,917	32,390	32,063	...	48	1,498,602	+ 251,837
Birmingham Motor 'Buses	1,751	1,727	1,740	2,075	...	1,855	1,808	1,870	2,310	...	48	94,687	+ 12,024
Blackburn Corporation	1,939	2,037	2,176	2,094	...	2,558	2,328	2,404	2,465	...	47½	123,468	+ 15,618
Bradford Corporation	11,195	12,457	11,377	11,446	...	13,975	13,761	14,859	13,644	...	48	634,615	+ 88,638
Burnley Corporation	3,082	3,033	3,032	2,970	...	3,471	3,516	3,426	3,498	...	—	—	—
Burton-on-Trent Corporation ...	496	558	501	497	...	644	593	596	605	...	48	29,099	+ 4,665
Bury Corporation	2,264	2,333	2,371	2,342	...	2,349	2,384	2,385	2,531	...	47½	119,974	+ 7,707
Chatham and District	1,438	1,443	1,495	1,382	...	1,629	1,432	1,511	1,592	...	8	12,579	+ 1,039
Cork Electric	...	...	...	...	...	...	...	...	...	...	—	—	—
Derby Corporation	1,921	1,973	1,956	1,920	...	2,247	2,247	2,154	2,308	2,391	...	48	108,586	+ 15,242
Dundee City	2,450	2,542	2,462	2,462	...	3,196	3,186	3,150	3,063	...	40½	124,449	+ 21,520
East Ham Corporation	1,784	1,772	1,766	1,686	...	2,119	2,011	2,105	2,138	...	47½	98,303	+ 8,538
Edinburgh Corporation	10,553	10,479	10,457	10,610	...	10,347	10,111	10,137	10,021	...	41	485,065	+ 44,835
Edinburgh Motor 'Buses	285	294	296	307	...	2,708	2,634	2,645	2,688	...	—	—	—
Glasgow Corporation	33,191	33,915	33,721	33,767	...	47,367	44,811	45,837	45,167	...	38	1,747,373	+ 492,840
Glossop (Urban Elec. Supply Co.)...	223	226	234	226	...	225	225	220	224	...	9	2,163	+ 151
Halifax Corporation	3,208	3,293	3,554	3,288	...	4,458	4,234	4,362	4,215	...	46½	200,194	+ 33,812
Halifax Motor 'Buses	82	78	89	79	...	120	112	110	106	...	46½	5,232	+ 1,280
Huddersfield Corporation	4,783	4,750	5,012	4,782	...	5,202	5,167	5,197	5,255	...	48	244,607	+ 11,426
Ilford U.D. Council	1,142	1,140	1,121	1,122	...	1,261	1,252	1,328	1,397	...	47½	61,277	+ 5,143
Ipswich Corporation	764	788	802	780	...	797	764	787	807	...	47	45,608	+ 2,266
Isle of Thanet...	494	512	576	553	...	507	487	481	539	...	20½	11,559	+ 324
Kilmarnock Corporation	309	325	314	306	...	372	356	357	576	...	41	15,133	+ 3,008
Lanarkshire	...	...	...	...	...	...	...	...	...	...	—	—	—
Leicester Corporation	5,965	5,956	5,863	4,901	...	6,396	6,447	6,215	6,346	...	—	—	—
Leyton U.D. Council	...	...	...	...	...	...	...	...	...	...	—	—	—
Liverpool Corporation	25,599	25,180	25,681	25,689	...	26,672	25,956	26,207	29,080	...	8½	220,223	+ 12,660
London County Council	78,151	77,615	78,089	76,184	...	98,519	94,691	95,594	96,785	...	47	4,288,491	+ 547,137
Maidstone Corporation	348	348	368	346	...	405	386	401	414	...	47½	22,654	+ 4,362
Manchester Corporation	30,424	30,531	30,985	30,748	...	38,661	37,632	37,699	38,758	...	48	1,645,585	+ 203,428
Newcastle-on-Tyne Corporation ...	9,247	9,264	9,066	9,279	...	11,305	11,309	11,188	11,237	...	47	524,414	+ 77,911
Nottingham Corporation	7,217	7,128	7,307	7,166	...	7,698	7,204	7,452	7,321	...	47	363,297	+ 21,116
Oldham Corporation	4,492	4,569	4,653	4,609	...	4,483	4,485	4,690	4,754	...	49	227,134	+ 10,129
Reading Corporation	1,533	1,561	1,648	1,463	...	1,586	1,455	1,541	1,496	...	47	78,172	+ 3,153
Reading Motor 'Buses	157	158	178	158	...	241	234	259	259	...	47	12,455	+ 10,974
Rotherham Corporation	2,292	2,286	...	...	...	2,829	2,750	...	...	...	44	117,773	+ 23,536
St. Helens Corporation	1,666	1,679	1,717	1,711	...	2,189	2,044	2,088	2,032	...	47	98,242	—
Sheffield Corporation...	19,542	19,515	19,340	19,823	...	20,706	20,543	20,399	20,318	...	48½	1,007,847	+ 186,561
Southampton Corporation	3,037	2,891	3,057	2,936	...	3,083	2,905	2,923	2,977	...	47	147,886	+ 15,831
Southampton Motor 'Buses	185	186	201	189	...	201	182	181	189	...	47	11,428	+ 6,904
Southend Corporation	1,416	1,406	1,476	1,399	...	1,657	1,525	1,589	1,690	...	46	108,272	+ 12,087
South Shields Corporation	1,432	1,453	1,445	1,441	...	1,916	1,854	1,871	1,862	...	48	91,797	+ 23,822
Sunderland Corporation	2,858	2,724	2,769	2,730	...	2,754	2,727	2,789	2,816	...	48	144,087	+ 7,579
Swindon Corporation	327	324	342	323	...	383	341	368	355	...	47	18,152	+ 1,151
Tyneside Tramways and Tramroads	1,008	1,020	1,041	1,006	...	1,186	1,108	1,181	1,145	...	8	8,788	+ 877
Wallasey Corporation	2,200	2,229	2,275	2,238	...	2,661	2,527	2,553	2,560	...	47½	124,028	+ 5,862
Walsall Corporation	1,654	1,658	1,651	1,643	...	1,937	1,853	1,913	1,904	...	48	85,951	+ 13,117
Walsall Motor 'Buses	717	736	729	700	...	1,387	1,316	1,285	1,253	...	48	55,787	+ 26,831
Walthamstow U.D. Council ...	1,780	1,805	1,807	1,799	...	1,814	1,769	1,812	1,924	...	47½	96,749	+ 14,873
Warrington Corporation	966	966	958	917	...	1,108	1,028	1,037	1,025	...	47	47,369	+ 4,718
West Ham Corporation	5,213	5,145	5,181	4,972	...	6,141	5,888	5,928	6,080	...	47½	274,311	+ 22,087
Wolverhampton Corporation ...	2,316	2,251	2,320	2,254	...	2,307	2,278	2,245	2,204	...	47	113,638	+ 14,715
Wolverhampton Motor 'Buses ...	365	349	361	355	...	612	679	618	590	...	47	21,842	+ 8,066

Colonial and Foreign Tramway Traffic Returns.

Companies Issuing Weekly Returns.

NAME OF COMPANY.	1920. WEEKS ENDED.					1921. WEEKS ENDED					AGGREGATE.		
	Feb. 7	Feb. 14	Feb. 21	Feb. 28		Feb. 5	Feb. 12	Feb. 19	Feb. 26		Wks.	1921.	Increase or Decrease.
	£	£	£	£	£	£	£	£	£	£		£	£
Anglo-Argentine	67,136	71,665	72,346	76,209	...	78,096	76,472	78,001	78,802	...	8	634,580	+ 76,968
Calcutta ... ... Rs.	93,404	90,196	91,163	88,947	...	*985	*411	*3,906	*38,261	...	8	415,594	— 337,209
Madras... ... ... Rs.	...	...	...	...	...	...	...	...	...	...	—	—	—
Pernambuco	7,959	8,402	8,475	7,872	...	5,013	4,789	4,655	4,458	...	8	38,560	— 32,044

* Decrease owing to Strike.

Companies Issuing Monthly Statements only.

	1919.				1920.		1920.				1921.		Wks.	AGGREGATE.	
	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.		1920-21.	+ or —.
	£	£	£	£	£	£	£	£	£	£	£	£		£	£
Ballarat & Bendigo	3,396	4,176	4,244	4,220	...	...	4,191	4,441	4,810	4,601	...	...	36	37,596	+ 5,566
Brazilian Trac. Mlns	9792,000	9980,000	9796,000	9739,000	9655,000	...	12043000	13442000	12199000	12600000	12875000	...	5	12,875,000	+3,220,000
Brisbane	41,980	43,530	...	...	...	...	45,440	46,300	...	...	...	...	43	459,330	+ 69,420
British Columbia ... $	684,946	710,405	733,981	783,324	...	...	756,950	781,706	805,633	868,677	...	...	26	4,709,709	+ 487,793
Buenos Ayres L'c'z.	45,310	49,692	50,634	55,873	52,643	...	53,603	57,619	56,747	62,857	...	...	31	397,397	+ 51,178
Burma	43,152	51,898	46,755	43,571	41,750	...	50,980	55,763	53,679	50,481	50,036	...	26	309,491	+ 38,682
Cape Town ...	19,759	...	...	...	...	...	23,699	...	25,628	29,768	...	...	—	—	—
Carthagena & H. ...	1,539	1,465	2,549	2,923	4,748	4,008	2,273	3,319	2,714	5,560	3,877	2,839	9	6,716	— 2,040
Cordoba	17,833	17,606	11,255	14,923	...	...	19,612	19,636	19,141	19,307	...	...	39	178,483	+ 29,636
East India ...	2,831	2,855	2,709	2,916	2,988	3,001	4,228	4,299	4,234	4,271	4,299	3,819	30	29,259	+ 9,198
Kalgoorlie	3,005	3,095	2,859	...	...	...	3,361	3,094	2,969	...	...	...	48	33,672	+ 3,180
La Plata	5,541	6,194	4,905	...	*3,145	5,892	5,656	6,310	5,573	...	6,506	*727	9	7,234	— 1,814
Lima	49,144	50,087	...	...	...	...	56,513	49,054	...	...	...	...	44	54,261	+ 2,151
Manila ... $	...	242,441	248,350	276,730	278,451	...	...	327,652	320,345	315,599	321,450	...	5	321,450	+ 42,999
Monte Video ...	...	...	40,308	...	...	45,259	...	...	43,846	...	...	48,119	17	191,763	+ 14,054
Para	24,386	27,849	25,421	24,412	24,306	...	23,185	26,784	24,285	24,253	24,231	...	4	24,253	— 159
Peruvian ... $	982,850	1179,130	1285,000	...	...	...	1187,300	1187,160	935,050	...	...	...	22	5,633,655	— 38,239
Port Elizabeth ...	4,372	...	...	...	...	...	5,803	...	6,620	8,185	...	...	—	—	—
Rangoon	6,812	7,678	7,379	7,517	R112000	...	7,657	7,455	6,964	8,000	R122558	...	5	R122,558	+ 10,558
Toronto ... $	1124,159	1123,801	1111,177	...	...	...	1270,651	1218,290	1250,414	...	...	...	48	13200,100	+1,646,664
Winnipeg ... $	381,248	428,339	461,449	...	...	...	426,647	444,899	477,957	...	...	...	48	4,754,505	+ 917,657

* Strike of employees.

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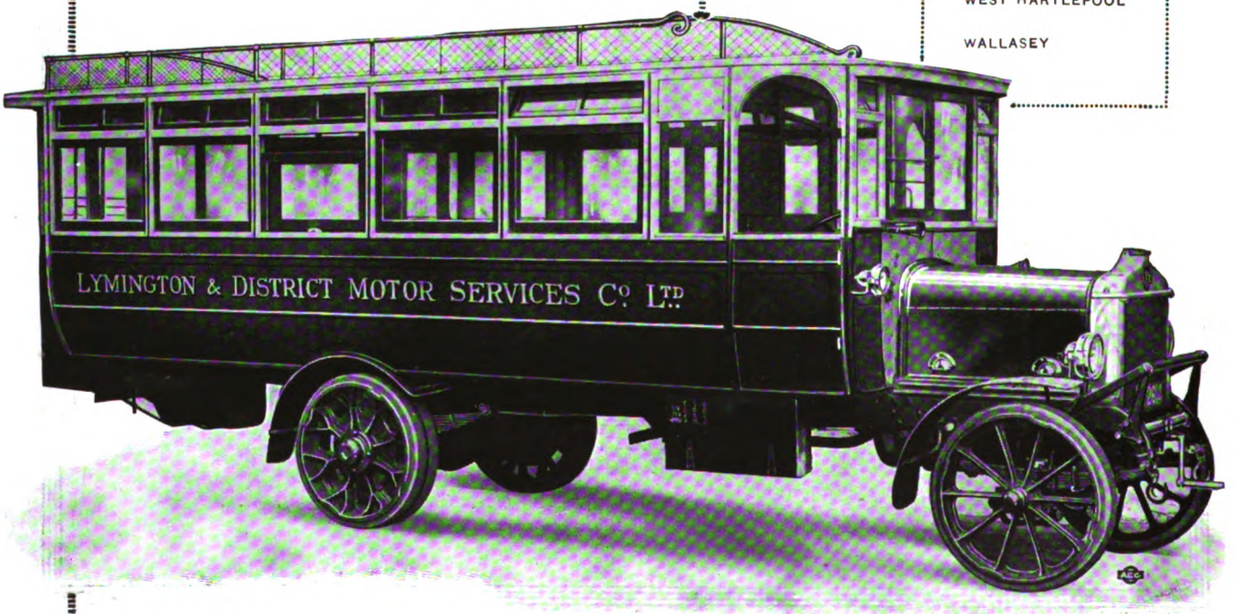

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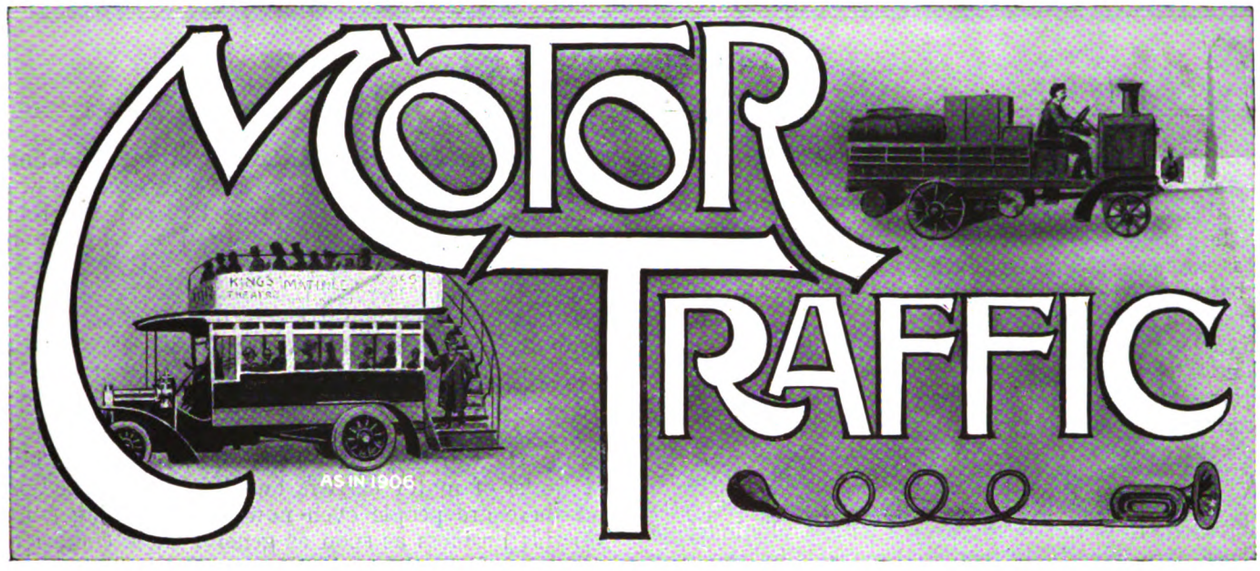

IMPENDING INDUSTRIAL LEGISLATION.

A great deal has been heard of the pledges of the Government to deal immediately with such matters as the protection of key industries, the prevention of dumping, and unfair competition facilitated by abnormal rates of exchange. It was hoped by those connected with the motor and other industries that legislation would be introduced at the beginning of the present session, but at the time of writing it is stated that the Bill is not yet completely drafted, and cannot be introduced until after Easter. Its efficacy is dependent very largely upon the possibility of bringing it into operation promptly, and any delay is therefore to be deprecated. Moreover, it seems not unlikely that the delay is due to the fact that there will be opposition in the House of Commons, and this may lead the Government to modify the measure very materially before it sees the light. It is not easy to understand why anti-dumping legislation should be regarded as so highly controversial. Dumping does not represent fair and free competition, but rather the abnormal effort of some foreign industry to crush its British competitors out of existence, or to preserve continuity of production in a slack period by means that can only have the effect of increasing unemployment in this country. It would appear that the safeguarding of key industries is regarded as almost, if not quite, as controversial, on the grounds that any measure of protection savours of tariff reform. This view seems hardly tenable when the form of protection suggested is prohibition of import except under licence. There is no question here of raising revenue by import duties, but simply of maintaining in existence comparatively small industries, like that engaged in the manufacture of magnetos, the absence of which prior to the war proved to be a very serious national danger. It may be that by limiting imports in connection with such industries we tend to bolster up prices, but if so, surely we must regard payments of this kind as in the nature of premiums on an insurance policy for national security.

THE COLLAPSED EXCHANGE PROBLEM.

The problem of counteracting the effects of collapsed exchanges is, perhaps, the most difficult of all. In a country approving the general policy of import duties on manufactured goods, it would be dealt with simply by raising such duties to the necessary point, probably applying much higher duties against recent enemy countries than against others. Actually it is questionable whether anything can be done to meet the case of a collapsed exchange in any allied country, since international agreements providing for "most favoured nation treatment" render it impossible to differentiate. Thus, for instance, if a duty were to be imposed in order to balance the collapsed exchange in Italy, this duty would be more than sufficient to balance the depreciated value of the franc, and would be indefensible except as a measure of pure tariff reform in its application to the United States. Recognising that anything that can be done legally in connection with competition assisted by collapsed exchange must almost certainly only serve to protect British industry against ex-enemy competition, it is still desirable that legislation should be introduced promptly. Germany is becoming a more and more serious competitor. It is impossible to see how, for example, the British motor manufacturer can compete on a price basis in the British market with the German manufacturer, so soon as the latter is in a position to export largely. It is not a question of efficiency in the organisation of the industry, but simply of the fact that at current rates of exchange the British manufacturer's labour bill is at least three or four times higher. This applies also to the cost of his raw material so far as the German manufacturer can obtain these materials without having to import them. The proposal to set up a Trade Board to examine and legislate for the special needs of individual industries in these respects is, perhaps, the only practical one short of a genuine tariff reform programme. It is, however, likely to be a slow process, and may in practice amount to little more than an excuse for maintaining that the Government have lived up to a pledge which they felt obliged to give but were not really able to redeem.

ALCOHOL FUEL PROGRESS.

From time to time many committees have existed for the purpose either of assessing the position as regards the possibilities of alcohol as a fuel or taking steps to improve that position. The Empire Motor Fuels Committee, who are now dealing with the subject, appear, however, to differ from all their predecessors inasmuch as they are actually conducting practical work along several lines. The whole problem is complicated by the fact that the practicability of

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alcohol fuel is as much a matter of legislation as it is of the production of alcohol supplies or the design of suitable engines. The last is the least difficult section of the problem, because, given supplies of fuel alcohol, it is known to be possible by admixture with other substances to produce a fuel which will give at least good, if not the best, results in a standard petrol engine of the present day, subjected only to slight modifications. The matter of production is more complex. From certain materials at present regarded as waste products, substantial quantities of fuel can be obtained, but the quantities, though substantial, would go only a little way towards the solution of the fuel problem. Were the supplies from such sources to be greatly increased, it would be necessary as a preliminary to secure correspondingly increased markets for the main products, the residues of which it is proposed to convert into fuel. It is by no means easy to decide just what crops ought to be grown in any particular district for the specific purpose of obtaining power alcohol as a main product.

Perhaps the greatest difficulty is the legislative one. We must not only find a really suitable denaturant for general use, but must get the authorities to recognise that denaturant as their standard. It is important that certain denaturants, when found satisfactory, should be approved throughout the Empire, so that alcohol denatured, say, in Australia, should be eligible for import here without extensive restrictions and delays. The Empire Motor Fuels Committee have these matters in hand, and are employing a chemist to conduct a series of experiments at the Imperial College of Science. Up to the present, re-distilled bone oil, shale oil products, and light caoutchoucine are among the substances which appear to be the most promising. Conferences have been held between representatives of the Committee and of the Oversea Empire Governments with a view to the unification of official policy in the matter throughout the Empire.

AN APPEAL FOR FUNDS.

The Committee have succeeded in securing Parliamentary authority for the use of power alcohol, but further legislation is needed in respect of restrictions as regards storage, transportation, and sale. They are constantly in negotiation with the Government on these matters, and meanwhile are conducting some practical experiments with a view first to ascertaining what alcohol mixtures can be used to the best advantage in existing engines, and secondly what changes in design are needed to make other possibly better mixtures commercially useful. The Imperial Motor Transport Council, which formed the Committee, is now appealing for funds to enable the work to be continued and accelerated. At present it is carried on as the result of subscriptions from the Royal Automobile Club and the Commercial Motor Users' Association, but it is hoped that other organisations, including those connected with motor manufacturers and traders, will also contribute, and it is anticipated that so soon as the substantial interest taken in the matter by this country can be demonstrated, Governments and other bodies in the Empire Overseas will make offers of support. The Committee is a strong one from the point of view of securing official recognition, including as it does such authorities as Sir George Ashdown, General Bagnall-Wild, Sir Charles Bedford, Sir John Cadman, General Sir Capel Holden, Professor Dixon, Sir Charles Metcalfe, and Dr. Ormondy. Their position is strengthened by the fact that they have behind them a Council which, though not official in its constitution, comprises official representatives of all the Governments of the Empire.

MOTOR CARRYING AND HAULAGE CONTRACTING.

Since the war there have been many newcomers into the ranks of motor carriers and haulage contractors, and there are people even now contemplating going into this business as soon as general trade conditions improve sufficiently to justify a start. There are, however, many pitfalls into which the inexperienced carrier may fall. The business may be highly profitable if really well conducted, but it requires a somewhat unusual combination of abilities on the part of its management. Perhaps the commonest cause of trouble is the assumption that the only knowledge needed is that required for the driving and the repair of vehicles. In point of fact, experience of business organisation is even more important. Very often small carrying enterprises fail through having endeavoured in the first instance to do too much with too little capital. The capital held in reserve should be at least equal to that invested in vehicles and plant. It is almost inevitable that the business will have to be run at a loss for a time while organisation is being perfected and goodwill is obtained. No attempt should be made to start unless some volume of certain business has been secured in advance. There are many varieties of carrying businesses, and the simplest for those who are not possessed of much experience is probably that which deals with the haulage of regular and substantial loads. The carrier should generally be able, when he has arranged for the out journey, to obtain loads also for the return. Here he has the advantage over a trader owning his own vehicles, and it is only by the elimination of empty mileage that he can reach a position in which he is able to quote rates that compare favourably with the costs of operation of vehicles owned by traders themselves. Perhaps the best prospects of development lie in the class of business that deals mainly with parcels deliveries, but this is a branch in which it is very difficult to achieve success without substantial capital. The efficiency of a system of parcels delivery depends on the ability of the carrier to cover the whole of an extensive district, and to effect sufficiently frequent deliveries everywhere. This means the running of many vehicles, and eventually the establishment of branch depots. In parcel delivery work the man owning only a few vehicles is hopelessly handicapped as against larger concerns. Traders who employ carriers for this purpose will pay for frequency and punctuality of service, and consequently the rate that can be obtained per parcel really depends on the number of vehicles which the carrier has at his disposal. If one can only offer a single delivery daily in certain districts while a competitor offers two deliveries everywhere, it is obvious that one must be content to accept a lower scale of payment.

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OMNIBUSES FOR COVENTRY.

NOTABLE MACHINE OF THE MAUDSLAY COMPANY

The illustration on this page depicts one of four single-deck omnibuses recently built by the Maudslay Motor Company, Limited, Parkside, Coventry, to the order of the Tramways Committee. Naturally, much interest was evoked locally on account of the contract having been secured by the well-known Coventry manufacturers, but a more important public consideration is that the new fleet adds considerably to the convenience and general status of the city's passenger-carrying service.

Each vehicle accommodates 36 persons with comfort (as against 28 in the older omnibuses), in addition to the driver; for smokers, a compartment at the rear is a desirable feature, this embodying 16 seats. There is ample room for three alongside the driver.

The bodies are imposed on the company's standard passenger-carrying chassis, the wheelbase of which is 15 ft. 6 ins., with a track of 5 ft. 6 ins. The engine, of course, incorporates the well-known Maudslay valve-in-head system, with its swing-over camshaft for laying bare the valves when occasion demands. The motor's four vertical cylinders have a bore and stroke respectively of 5 ins., and the unit develops 40 B.H.P.

Maudslay Omnibus for Coventry.

The following details describe the principal features of the chassis.

The vertical engine is of 40 H.P., having four cylinders cast in pairs, and bored out to 5 ins., the stroke being 5 ins. An ingenious form of cast-steel sandwich-flange, with an aperture of 8½ ins. by 3 ins., is utilised for rigidly connecting the cylinder pairs, so that the result is a monoblock construction, but with the advantage of economical replacement or overhaul. The extra large openings thus provided in the water-jacket permit of a liberal-sized core for casting needs, as well as affording an unrestricted water fairway between the cylinders. A total absence of pockets is a feature of the combustion-chamber, consequently it is machined throughout, thus restricting carbonisation and pre-ignition. The valves have their operating gear directly overhead. Provision is made for the easy withdrawal of valves apart from the engine. The pistons and connecting rods can be easily taken out through extra large doors in the crankcase.

A reversed cone clutch, Ferodo-lined, transmits the engine torque, and it is quite an easy matter to renew the friction fabric. The spring thrust is self-contained, and ready means of adjustment are provided. The Maudslay clutch-stop gives quick and smooth action. Another notable feature is the gear box, which is held to be unrivalled for efficiency and simplicity. It has four speeds, the fourth being a direct drive. The hind live axle is in the banjo form, invented by the Maudslay Company, being especially suitable for heavy loads. The final drive worm-gear and differential can be separated from the main forging, thus facilitating inspection and maintenance. The differential shafts take no dead load. There is a duplicate water-circulation, and the radiator has an aluminium fan. A Zenith carburetter and a H.T. magneto are installed. Lubrication is by pressure.

SMOOTH RUNNING AND LACK OF VIBRATION.

This brief outline of the chassis would not be complete without reference to the excellent suspension, the semi-elliptic springs being built up of the finest steel. Their extra length and correct deflection give smooth riding on the worst of roads. Braking is effected on the rear wheels, and the foot-brake operates immediately behind the gear box.

The coachwork was supplied by the General Seating Company, Limited, Westminster, and is an excellent example of the body builder's art. It has been judiciously constructed with due regard as to where strength is necessary, and the comfort of passengers has been well considered. The seats are placed athwart the body, and the cushions are liberally sprung and well upholstered, affording a maximum degree of riding comfort. The front screen, built up to the driver's canopy, provides ample protection in all weathers, and the seats arranged at the extreme end of the body are also fully enclosed. Both by day and night it is excellently lighted, electricity being the medium after dark.

Despite the increased accommodation available, the total weight of the vehicle is 7 cwt. less than that of the older pattern. If, as the manufacturers claim, the new bodies are actually stronger despite their lightness than those they replace—a fact which time alone can of course prove—the manufacturers will stand to gain great credit, particularly as it appears that the new fleet takes Coventry's rather notorious hills on top gear without perceptible effort. It is understood that the secret of the lightness-plus-strength of the new bodies consists of the elimination of bulky timber, the use of light but very strong timbers of special shapes, and the reinforcement of all joints by light steel castings of patented patterns.

Residents living on the route havefreely commented upon the smooth running, quiet service and absence of vibration.

PETROL LORRY EXPERIENCE.*

By A. R. HERITAGE (*Surveyor to Cookham Rural Council*).

During the early part of the year 1919 considerable difficulties existed with regard to obtaining suitable team labour for haulage of materials for repair and maintenance of highways in the district. It was hoped that these difficulties would righten themselves, being an aftermath of the war, but such was not the case, and conditions went from bad to worse, and after consideration it was decided to purchase a Dennis petrol lorry with a side tipping body at a cost of approximately £1,200. Messrs. Dennis Brothers, of Guildford, supplied the chassis and engine, the body being supplied and fitted by the Eagle Engineering Company, of Warwick. By dealing direct with the two firms a saving of £40 was effected on the cost of the body.

A good deal of discussion arose as to whether a steam or a petrol lorry should be entertained, but so far as the writer was concerned the deciding factors in favour of "petrol" as compared with "steam" were as follow—

(1) Speed of ten or twelve miles per hour as against five miles, consequently a greater number of journeys and more mileage. (2) No waste of time running to and from water points and taking in water. (3) Scarcity of coal at the time, and convenience of petrol as compared with coal fuel. (4) Weight unladen of petrol lorry being about half the weight of a steam lorry, considering that the lorry would be travelling on the district roads, many of which would be called upon to carry a greater strain than they could withstand. (5) No trouble with tubes and boiler. (6) Two men only required with a petrol lorry as against at least four for a steamer.

A SAVING OF 13·80D. PER TON-MILE.

On Saturday mornings a practice has been made for the lorry to take out one load (or more if short journeys), and devote the remainder of the morning to washing down, oiling, greasing, and general overhauling, which has proved most essential and economical in the long run. The only satisfactory way of coming to the actual saving effected (between haulage work by contract and mechanical haulage under your own control) is to adopt the ton-mile principle. Taking into consideration the class of work being done, doubtless if the lorry was engaged on a variety of works, the best way would be to adopt the hour or day work system. Taking as an average 300 working days in the year the cost = 638·25 pence, or £2 13s. 2¼d. per day; and taking the number of working hours at 50 weekly, the cost = 73·60 pence, or approximately 6s. 1½d. per hour. The lowest tender for horse cartage in March, 1919, was at the rate of 2s. per ton-mile, but later on in the year the cost equalled 2s. 6d

* A Paper published in the Institution of Municipal and County Engineers' *Journal*.

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per ton-mile. Taking as a basis 2s. 3d. per ton-mile as a fair average contract price for horse cartage, there has been effected a saving of 13·80 pence per ton-mile on a total of 14,503, approximately £833 18s.

$$\text{Cost per ton-mile} = \text{cost} \div \left(\frac{\text{Miles}}{2} \times \frac{\text{Tons}}{\text{No. of journeys}}\right).$$

Depreciation is written off at the rate of one-eighth of total cost of lorry each year, viz., £150.

Item £647 16s. 3d. in the following schedule is made up as follows—

	£	s.	d.
Petrol, oil, grease, sundries, or 5·91 m.p.g. ...	231	8	0
Driver and man's time	316	13	3
Depot and establishment charges, including insurance, licences, and interest on £200 at 6 per cent. for purchase of depot... ...	27	15	0
Interest on cost of lorry, £1,200 at 6 p.c. ...	72	0	0
	£647	16	3

SCHEDULE OF WORK DONE AND THE COST.

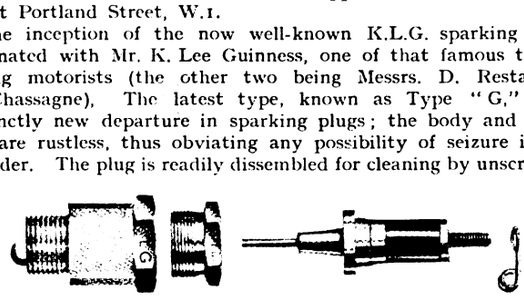
Miles covered, 9,704; number of loads hauled, 1,281; weight of loads hauled, 3,829 tons; petrol, 1,640 gallons; engine oil, 43 gallons; gear oil, 10 gallons; grease, 21 lb.; cost of labour, etc., as above, £647 16s. 3d.; depreciation on capital, £150; total, £797 16s. 3d. Cost per ton-mile, 13·20d. Cost per hour, 73·60d.

In addition to the foregoing particulars very useful work indeed has been done by the lorry in connection with the work of removing the 200-gallon tar-spraying machine, rotary broom, and tools from one part of the district to another during tarring operations—a costly process by horses, often taking the greater part of the day to remove with two horses. This work has been accomplished in less than two hours with the lorry—a considerable saving at the present rate per day for horse, cart, and man of £1. Another very costly and slow process was the collecting of empty tar barrels and the haulage of full ones from the stations by horses and carts, not more than about four or five empties or three full ones making a load, whereas with the lorry fifteen empties or ten full ones made an average load. The miles covered per gallon equal approximately six, which is considered very good for a 3½-4 ton lorry; many lorries of that weight average only 5¼ miles per gallon.

A NEW SPARKING PLUG.

A novel competition for users of sparking plugs has been organised by Messrs. S. Smith and Sons (M.A.), Limited, for the purpose of introducing the new "G" series of detachable K.L.G. plugs, full particulars of which can be obtained on application to Devon House, Great Portland Street, W.1.

The inception of the now well-known K.L.G. sparking plugs originated with Mr. K. Lee Guinness, one of that famous trio of racing motorists (the other two being Messrs. D. Resta and J. Chassagne). The latest type, known as Type "G," is a distinctly new departure in sparking plugs; the body and gland nut are rustless, thus obviating any possibility of seizure in the cylinder. The plug is readily dissembled for cleaning by unscrewing



the gland nut while the plug body remains in the cylinder, when the "centre" can be removed and replaced after cleaning with the certainty that the spark gap will not be incorrectly set, owing to the peculiar construction of this plug, which insures the spark gap remaining constant. A further unique feature is the "centre" itself, which forms a complete unit, which is supplied separately boxed at half the cost of a new plug, it being therefore possible to carry spare centres instead of spare plugs, as, of course, the plug body practically never wears out.

Too much insistence cannot be laid upon the paramount importance of obtaining plugs of a design which has been ascertained by actual test to be suitable to the engine in which they are intended to be used. No matter of whose manufacture, a plug designed for a hot engine will always tend to soot up or oil up in a cool one; while a plug designed for a cool engine is almost certain to pre-ignite in an engine in which high internal temperatures are developed.

OMNIBUS SERVICES.

WALSALL.—The Tramways Committee have started a new service of omnibuses to Lichfield.

WEST BRIDGEFORD.—A loan of £2,342 is to be obtained by the Urban Council for the purpose of extending their omnibus undertaking.

SHEFFIELD.—The corporation report that the amount to be paid in taxation on the reduced number of motor omnibuses now in service is £2,498 per annum, and for the vans, lorries and other motor vehicles £143, a total of £2,641 per annum.

BURTON-ON-TRENT.—The Town Council have arranged that omnibuses plying in the South Derbyshire area shall use the Corporasion stand in Horninglow Street, and those plying in the Staffordthire area the stand in New Street for parking purposes.

WEST RIDING OF YORKSHIRE.—Five omnibuses which serve Spen Valley and adjacent districts in the West Riding of Yorkshire ceased running on February 26. The Yorkshire (Woollen District) Tramways Company state that the financial results from the service do not justify its continuance.

PLYMOUTH.—The Tramways Committee have asked the Watch Committee to withdraw the charge of 1½d. per omnibus mile in respect of the use of the routes by the Corporation omnibuses in view of the substantial sum now paid in taxation, the net proceeds of which will be wholly devoted to the maintenance and improvement of highways.

DEPTFORD.—The Borough Council consider some roads to be unsuitable for omnibus traffic, but states that they have no power to interfere with the resumption of omnibus services on certain routes which are deemed undesirable. In other cases, however, the Council have the power to refuse consent on the ground that the road is unsuitable owing to its steepness and that the cutting up of the road by omnibuses would render it dangerous to other traffic.

HULL.—Reporting to the Tramways Committee on February 21, on the inquiry by a Ministry of Transport inspector into the application to run omnibuses to Stoneferry, the town clerk stated that the inquiry was the first that been held since the Road Act came into operation. In consequence of what arose at the inquiry, he advised the committee that it was now necessary to specify the routes which they desired to use, as the inspector might report adversely on one route already submitted, owing to its narrowness in the town. No doubt that road would have to be widened, which would be a costly undertaking, but there was the probability of a greater revenue. The Committee decided to submit two routes and to ask for a maximum fare of 2d. per mile.

LONDON.—Replying to a question by Mr. Gilbert, M.P., at the meeting of the London County Council on February 8, Mr. Squires, chairman of the Highways Committee, said that it had been reported that Southwark Council had no observations to offer on the Omnibus Company's proposal to operate a service via Southwark Street and Southwark Bridge. Such a service would probably be a useful feeder to the tramways, and might be regarded as co-operation on the part of the company. The length of tramway route which would be affected would be about 965 yards. The annual cost of maintenance of the track was approximately £1,300. These particular sections of track are not separately assessed, but the approximate amount paid in rates was £660 per annum.

EDINBURGH.—Details of receipts from omnibuses over routes in Edinburgh where cable cars had formerly been used are contained in a report presented by the manager to the Tramways Committee. On the Goldenacre Mound route, comparing six weeks of the cable cars last year with the corresponding past six weeks, there had been an increase in passengers of 53,519. There had been a decrease in the mileage run of 4,445. The increase in receipts amounted to £846, which represented, according to the manager, an increase of 8·9d. per car mile. Taking all the northern routes for the past three weeks and making a comparison with the three weeks of last year when cable cars were running, the returns showed an increase in passengers of 61,769, an increase in mileage of 7,750, and an increase in receipts of £1,163, representing an increase of 2·2d. per car mile.

OMNIBUS SPLASH GUARDS.—Edinburgh tramways department have decided to make experiments with three types of splash guards on their omnibuses.

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LONDON GENERAL OMNIBUS COMPANY.

Chairman's Review of an Eventful Year.

Lord Ashfield presided at the annual meeting of the London General Omnibus Company on February 17, and in moving the adoption of the report and accounts said—The year 1920 has seen a large number of steps taken to restore your company to the position which it occupied previously to the war. When that year opened your company had in stock 2,111 B type omnibuses; 247 omnibuses which had been repurchased from the War Office and adapted roughly for use as traffic emergency omnibuses to cope with the serious congestion which was occurring in the streets; 180 lorry omnibuses, which had been hired from the Board of Trade; and two experimental K type omnibuses, making a total of 2,540 vehicles.

Successful New Vehicles—Route Extensions.

By the close of the year the fleet of vehicles had been slightly reduced by withdrawals of B types in anticipation of new K types taking their place before the summer working. All the lorry omnibuses had been withdrawn, the traffic emergency omnibuses were a few remnants, and B type omnibuses were being rapidly replaced by the K type. Of these 547 were in active daily use, and the first of the S type, being an experimental vehicle, had been put upon the streets. During the year the last of the garages which had been taken over by the Government for war purposes was returned to your possession, and the further development of your company's operations in the country surrounding London is engaging the attention of the board. The chief engineer advises us that the S type is even more efficient and economical in operation than the K type, so that much progress has been made in the improvement and development of the rolling stock.

During the year the board had under consideration the question of effecting economies in the expense of operation. Authority was given for the purchase of thirty acres of land in Chiswick, and for the erection of a central overhaul depot. It is hoped that this central overhaul depot will be completed and ready for use about June of this year. It is expected that with the coming year the development of your fleet and of the fleets of those companies allied with it will approach a total number of 3,000 motor omnibuses. The road worked during the year reached a maximum of 616 miles.

Success of the Revised Fares.

On September 26, in conjunction with the Underground Railways and with the London County Council and other tramways, your company introduced a revised scheme of fares, which had the effect of increasing the then existing fares by about 30 per cent. The result would seem to indicate that the increase in fares had been successful, and had been accepted by the public as a fair and reasonable one. In connection with the increase of fares, two problems would seem to merit your attention. The first of them was the adoption of an initial fare of 1½d. As you will know, the London County Council Tramways continued the initial fare of 1d. We are therefore able to establish a comparison between routes where one initial fare is in operation and routes where another initial fare is in operation. Tests seem to indicate that from a revenue point of view the higher initial fare is fully justified. That it is justified from a financial point of view was known before, for it is not now possible to carry a passenger upon a motor omnibus for 1d. and have any margin available over the working costs.

Loss from Competitive Mid-day 2d. Fare.

The other problem to which I would like to make brief reference is the introduction of the cheap mid-day fare of 2d. upon the London County Council Tramways. Your company dissented to this as being a contradiction. However, in deference to the insistence of the London County Council, your company adopted, in the tramway area, the cheap mid-day fare of 2d. between points practically identical with those between which it operated on the tramways. In the last three months of 1920, 5,189,495 of these cheap tickets have been sold, representing less than 2½ per cent. of the total tickets sold altogether, or about 6 or 7 per cent. of the tickets sold in the area affected. The number would not seem therefore a very material factor. After allowing for the small increase in passengers which has accrued in consequence of the introduction of the cheap 2d. tickets, there is a loss in revenue which is estimated as the result of tests at about £12,000 a year, and is a growing loss. I think therefore that it will be agreed that our original point of view with regard to these tickets was sound. Yet for the protection of the traffic against diversion to the tramways it will be essential that we should retain these tickets so long as the tramways do. Otherwise we estimate that our loss by the abstraction of traffic will be still greater.

Providing Services for County Councils.

In the opening of the year the position of the London General Omnibus Company, impaired as it was by its liberal war services, was being challenged. Bills for the working of omnibuses in competition with the omnibuses of this company had been deposited by the London County Council, the Middlesex County Council, the Hertfordshire County Council, and the Erith Urban Council. Your company was successful in convincing Parliament that the institution of competition at this stage was not only unfair but prejudicial to the real interests of the public. It was, however, pointed out to us that the rejection of the Bills placed upon the company an obligation to make reasonable provision for the traffic which the promoters desired to serve. We were not unmindful of this obligation, and not unwilling to accept it. Direct negotiations were opened up with the London County Council for preliminary and experimental measures of co-ordination, and the through tickets between car and omnibus instituted at Victoria on February 16 are the earnest of this effort being carried as far as may be found practicable. With regard to Middlesex, Hertfordshire, and Erith, arrangements have been or are being completed for the establishment of routes of omnibuses to serve the development of those areas, and we expect that this may be the opening of a period of much closer co-operation between this group of companies and the local authorities in the provision of traffic facilities.

Prospect of Wider Co-operation.

The most hopeful sign of all has been the action of the London County Council in approaching the Ministry of Transport with a view to direct negotiations between representatives of the Council and of this group of companies taking place under the auspices of the Ministry. We felt it our duty to take part in these negotiations, which are now proceeding. If a successful outcome is reached, the traffic situation in London will be much simplified, and improvement will be more rapid, because all efforts will then be directed to a common end.

Turning now to the revenue side of the accounts, you will observe that there was a deficit of £286,942 in the revenue account, which was met out of the common fund in accordance with the terms constituting such fund. This deficit was fortunately less by £137,062 than the amount required in respect of the preceding year. In addition to the sum needed to make up the deficit, your company received out of the common fund £113,437, and adding the balance brought forward from the previous year, £59,726, the amount available for ordinary dividend is £173,163. No interim dividend has been paid, and it is now recommended that a final dividend for the year of 5 per cent., free of income-tax, be paid, which will absorb £114,320, leaving £58,843 to be carried forward to the credit of next year—an amount of £883 less than was brought into the accounts. This is the second year in which this company has failed to be self-supporting. Such a situation could not be allowed to continue. The common fund was never intended to permit of one form of transport being a permanent burden on other forms. It is an invaluable device for ameliorating temporary misfortune, but it must be used with discretion. Fortunately the new scheme of fares appears to offer a remedy, and your directors have every reason for believing that your company will not again be a burden on the fund.

Mr. H. A. Vernet seconded the motion, which was carried unanimously.

WAR OFFICE SUBSIDY FOR LORRIES.

In the House of Commons on February 22, Sir A. Williamson, Parliamentary Secretary, War Office, informed Mr. G. Locker-Lampson that a scheme for the renewal of a subsidy of mechanical transport vehicles registered for use in the event of mobilisation was under consideration.

Mr. G. Locker-Lampson asked if it was the case that the subsidy was to be £40 per annum per lorry, and whether the House would be given an opportunity of considering the matter.

A form was handed to Sir A. Williamson, who said it was only a proposed form. He thought it was reasonable to suggest that a binding arrangement should not be made until the estimates were discussed.

Colonel J. Ward.—Is it not possible to register the vehicles for use in an emergency without any subsidy? (Applause.)

Sir A. Williamson asked hon. members to give notice of questions.

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MOTOR TRAFFIC

MUNICIPAL AND COUNTY ENGINEERS.

INSPECTION OF LABOUR-SAVING APPLIANCES AT HOLBORN.

On February 18 the Metropolitan District Meeting of the Institution of Municipal and County Engineers was held at Holborn.

In connection with this meeting, and at the invitation of the Institution, a number of the Engineers and Surveyors of the Metropolitan Boroughs and Provincial Areas visited Upper Montague Street and Woburn Square, London, W.C., to witness a demonstration of the Jaeger concrete mixing machine, the Karrier road sweeping and collecting machine, the "G. V." electric van, fitted with movable floor, a Maudslay tipping wagon, Lacre gulley-

Municipal and County Engineers on a Visit of Inspection.

cleaner, and the Springfield tandem steam road roller, together with other plant.

Mr. E. F. Spurrell, hon. district secretary of the institution, explained that they had been invited to examine, amongst other things, the Jaeger concrete mixing machine. It was essentially a labour-saving device. Whereas the navvy needed a respite to straighten his back, this machine was unceasing in its labours. In addition to that machine, they would see a number of other labour-saving devices, some of which had been in use in Holborn with all the success anticipated.

Mr. Ivan Benson, manager, machinery department, Messrs. Millars' Timber and Trading Company, Limited, who gave a detailed explanation of the mixer, mentioned that the machine effected at least a saving of 50 per cent. It was manufactured in different sizes, with various capacities, one larger than that before them and one smaller. The output of the machine before them was forty cubic yards for an eight-hour day. One specific advantage was that whereas the ordinary mixer often required a man with chisel and hammer to clean it out, this machine was automatically cleansed, because it discharged all its contents.

Commenting on the Springfield roller, Mr. Benson said the two great advantages were the steam steering gear and the twin rollers, which prevented the corrugation caused by the ordinary roller.

The demonstration of the Karrier sweeping machine was not quite the success anticipated, owing to a misunderstanding. As it was expected that ordinary street sweeping was all that would be required the brushes were set for this duty. The test prepared for the machine, however, was of a very different character, for a thick coating of refuse was spread on the road surface. As there was not time to adjust the brushes for this heavy duty, the demonstration took place under circumstances which were a heavy handicap. In spite of this, the machine swept and collected the refuse, although not so cleanly as it would have done had the brushes been properly set for the purpose.

The Mayor of Holborn, who presided at the luncheon at the Holborn Restaurant, in welcoming the party said anything that tends to the quick repairing of the streets and the cleansing of gullies would be a very great benefit to the ratepayers and to the surveyors who had to see that the work was done.

Mr. Pickering, assistant surveyor, Epsom Rural Council, referring to the Jaeger mixer, said they bought one of these machines in August and it had worked perfectly well on tar-macadam. Referring to the costs, he said that including mechanical costs, interest and depreciation, it worked out at 2s. 9d. a ton, but excluding the cost of tar.

Mr. A. E. Collins, borough surveyor of Norwich, referring to the Springfield roller, described it as the best thing he had seen that day. "I was very much struck by it," he said, "particularly by the facilities for turning the roller. Immediately it stops, it reverses. You do not get that corrugation that you might get with other rollers. It produces a perfectly level surface." One of the best roads laid in his borough, he said, had, for its material, the Aztecphalte they had seen that day.

Mr. O. E. Winter, surveyor to Hampstead Borough Council, emphasised the advantages of the Springfield roller. He had had it at work, and had been immensely impressed by the work it had done on ashphalte. Some of this material, he said, had been laid down on the hills of Hampstead five or six years ago. Those roads were still in splendid order and he was struck by the foothold obtained by horses on inclines. He understood arrangements were being made for the manufacture of the machinery in this country.

Mr. Benson, replying to a question as to the probabilities of the machines being manufactured in this country, said—"A few days ago I had a meeting with the managing director of one of the largest manufacturing firms in England. I was told that at the moment it was not practicable to manufacture these machines here. It is possible, however, that they will ultimately be manufactured in this country."

Mr. T. W. A. Hayward, Ex-President of the Institution, surveyor to Battersea Borough Council, observed that even the most advanced men in the Labour Party to-day had begun to see the advantage of having machinery which assisted their fellow-workers in their labours. The human element often failed at the critical moment.

Mr. N. Scorgie, borough surveyor, Hackney, regretted that he was prevented from attending the morning demonstration. Referring to the concrete mixer, he said a machine of that type had been used in his district. It had mixed the materials in an admirable manner, and in 91 days the saving effected over labour had paid for the machine. He had had some criticisms to offer. He did not think, for instance, that the position of the mixer on the truck was quite to the best advantage, nor did he think the petrol consumption all that it ought to be. These objections had largely

Springfield Tandem Steam Roller.

been overcome and the machine to-day was superior to that handled on the first occasion. It was an excellent machine, one which could work day in and out, and give excellent results; but it would be an advantage if they could get a machine of larger capacity.

MACHINERY AND UP-TO-DATE METHODS.

Mr. E. F. Spurrell, Holborn borough engineer, dealt with the question of utilising machinery in every direction that conditions permitted. He was gratified to know that the demonstration would in material measure advance the adoption of labour-saving and labour-aiding appliances. "We must get away from old-fashioned ideas," he said. "We must work with the times and use up-to-date methods. They are there for us if we can get the support of our Corporations."

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MOTOR TRAFFIC

Mr. Walter Green, of Millars' Trading Company, moved a vote of thanks to the Mayor for presiding, after which an adjournment was made to Battersea, where a "Cummer" Asphalt plant was seen in operation. It was shown how the materials are automatically fed into the machine, dried, screened, and weighed to the exact proportions necessary for a perfect road surface. The demonstration aroused the keenest interest amongst those who witnessed its performance. The "Cummer" portable asphalt plant is a complete modern equipment incorporating outstanding features of construction evolved from a specialised experience extending over 25 years. "Cummer" dryer is the most important unit of the equipment, and owing to its improved design, gives an exceptionally large capacity without the excessive temperatures which are a frequent cause of short life in this class of plant.

Jaeger Concrete Mixing Machine.

Jaeger Concrete Mixer Discharging.

A visit was afterwards made to the premises which have been secured in Kirklin Street, Battersea, by Messrs. Millars, where the visitors inspected a steam paver, a number of size 3E mixers, a petrol-driven diaphragm pump, a petrol-driven air compressor, a portable electrically operated lift, Stuebing trucks and platforms, compressed air paint sprayers, and other machinery designed to eliminate superfluous labour and to accelerate construction work.

MOTOR VEHICLES FOR MUNICIPALITIES.

Weston-super-Mare Urban Council report delivery of their new fire engine.

Cleethorpes Urban Council are borrowing £1,285 for the purchase of motor vehicles.

Oxford City Council have obtained permission to borrow £725 for a motor fire engine.

Ashton-in-Makerfield Council are borrowing £1,467 for the purchase of a tipping wagon.

Ashton-under-Lyne Council are raising a loan of £1,750 for the purchase of a fire engine.

Slough Urban Council have obtained permission to borrow £3,500 for fire brigade purposes.

Greenwich Borough Council propose to secure a second-hand wagon which has been offered at £500.

Colchester Corporation have taken delivery of a new Merryweather motor fire engine, purchased at a cost of £2,000.

Essex County Council report the purchase of another steam wagon from Clayton, Limited, of Lincoln, at a cost of £1,425.

Barnes Urban Council have asked some of their members to examine a second-hand ambulance which was offered for sale for £500.

Bradford Guardians have insured their Armstrong-Siddeley landaulette with the Municipal Mutual Insurance, Limited, against the usual risks for an annual premium of £17 10s., less 15 per cent.

Wolverhampton Watch Committee have accepted the tender of Messrs. Dennis Brothers, Limited, for the supply of a 60-feet fire escape, and fixing it to one of the Dennis Gwynn motor fire engines, at a cost of £320.

Westminster City Council have purchased motor spare parts for their Thornycroft wagons from a dump in France, at a cost of £202, one-tenth of the cost if now purchased new in England. The cleansing superintendent went to Rouen to make the purchases.

London County Council have sanctioned a loan of £788 by the Hammersmith Borough Council for apparatus required for the charging of six electric vehicles. By means of the new apparatus it is estimated that the cost of energy supplied to the vehicles will be 1½d. a unit, as compared with 4d. a unit now being charged for this work, which necessitates the running of a special small steam generator.

Glasgow Corporation propose to purchase from Messrs. Rossleigh, Limited, a 30-h.p. landaulette car, having a Daimler chassis and a Windover body, for £1,750, for the use of the Lord Provost. The Parks Committee are purchasing either a motor cycle, with side-car, or a two-seater car, for the use of the assistant director in order to undertake the inspection of works in progress at the parks.

ROAD CHARGES ON OMNIBUSES.

Ministry of Transport State Their Policy.

A statement has been issued by the Ministry of Transport in reference to the provisions of the Roads Act, 1920, and as to mileage charges or annual payments in lieu of those charges imposed upon motor omnibuses as a condition of the user of the highways.

The Ministry point out that when the power to impose such charges was passed, the excise duty payable in respect of motor omnibuses was practically nominal in amount, and that the question had been considered by the Departmental Committee on the taxation and regulation of road vehicles when it made its recommendations as to the new scales of taxation, which scales have now, with certain modifications, been adopted and imposed, and motor omnibuses, together with other heavy vehicles, now contribute a substantial sum in taxation, the net proceeds of which will be wholly devoted to the maintenance and improvement of highways.

Accordingly, Section 10 of the Roads Act, 1920, authorises the Minister of Transport to suspend, modify, or determine the liability to make the payment of a mileage charge, and the Ministry states that where applications are made under that section it would be disposed to acceed to such applications unless there were very exceptional circumstances which would justify the continuance of the payments. The Ministry further state that with regard to appeals under the Local Government (Emergency Provisions) Act, 1916, for permission to commence new routes, the provisions of which Act expire in August, 1921, it would adopt a similar procedure, as indicated in the case of mileage charges.

Walsall have asked the Ministry of Transport to determine the liability of the Corporation under its Acts 1914 and 1919, to make annual mileage contributions toward the maintenance of roads in respect of the Corporation's omnibuses.

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MOTOR TRAFFIC

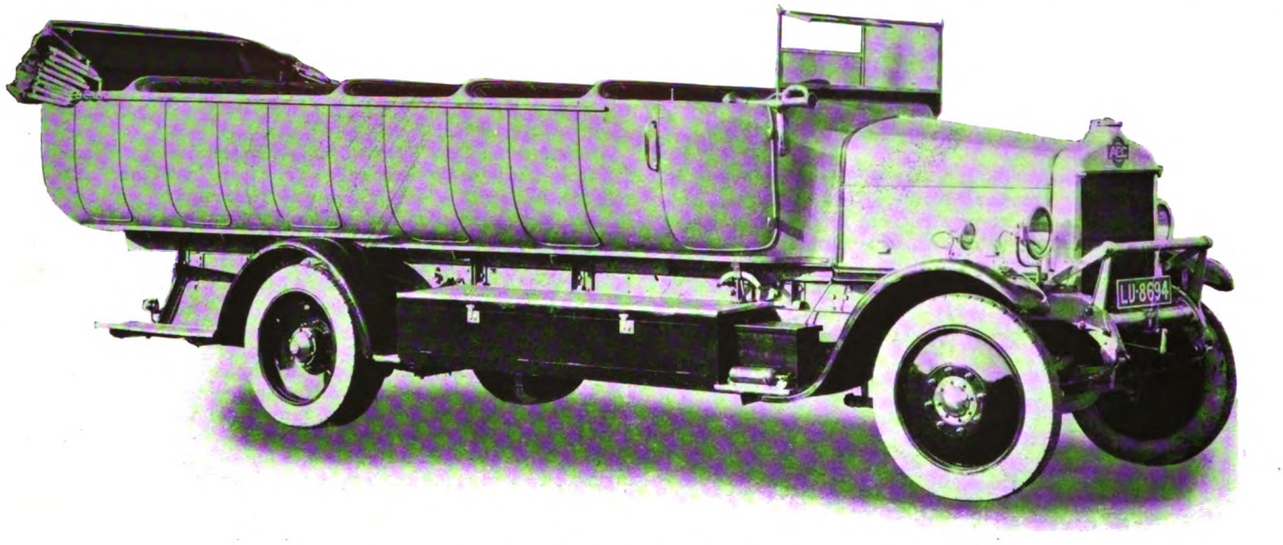
MOTOR TRAFFIC NOTES.

PETROL PUMPS IN HIGHWAYS.—Walsall Watch Committee refuse to grant applications for permission to place petrol pumps in certain of the public highways.

NO EXEMPTION FOR DISINFECTING VANS.—The London County Council notify Bethnal Green Borough Council that though disinfecting vans are not used for commercial purposes there is no provision in the law for the exemption of such vehicles from payment of the new licence fees.

MUNICIPAL TRANSPORT SERVICE.—The electricity committee of Willesden Urban Council report that the whole of the transport of the department is now in full service, and subject to the needs of the dust collection being adequately met, haulage can be undertaken for other branches of the Council's service.

RECEIPTS FROM MOTOR TAXATION.—Southampton County Council reports that to the end of January 6,583 road vehicles had been declaring for licensing under the new *regime*, and that £83,000 had been put to the credit of the Ministry of Transport motor tax account. Part of this sum would have to be refunded by way of rebate in respect of engines constructed prior to 1913.



A.E.C. Latest Type of Motor Coach Exhibited at the Recent Scottish Show.

MOTOR LORRIES IN NEW YORK.—New York City has not only more motor lorries than any other city in the world, says the *Commercial Vehicle* (New York), but more motor lorries than are used in the whole of the British Isles. Approximately one-tenth of all the motor lorries in the United States are operated in New York City, where in 1920 110,000 new lorries were registered.

NO LICENCES FOR SIDE-CAR TAXICABS.—Replying to a question from Viscount Curzon in the House of Commons on February 22, the Home Secretary said applications for licences for side-car taxicabs could not be granted, the Departmental Committee which considered the introduction of side-car taxicabs having reported unfavourably. Viscount Curzon.—Some of these vehicles plying for hire in the provinces are very popular. Mr. Shortt.—I am informed that they are very unpopular.

OBJECTION TO CENTRE STANDARDS.—Glasgow Tramways Sub-Committee have received a letter from the inspector of lighting referring to the obstruction to vehicular traffic, and to the number of accidents caused by the erection of the electric standards in the centre of Great Western Road, and suggesting that arrangements be made for having them removed to the sides of the road. The sub-committee agreed to confer with representatives of the Watching and Lighting and Statute Labour Committees on the matter.

MOTOR CAR REGULATIONS.—Sir Arthur Stanley, on behalf of the Royal Automobile and associated clubs, has placed before the Departmental Committee on the Taxation and Regulation of Road Vehicles his views with regard to the maximum speed for motor cars, and the conditions under which driving licences should be granted. The abolition of the present speed limit of 20 miles an hour is advocated in view of the improvement that has taken place in motor cars and roads since 1903, and the fact that the danger to the public is not a question of speed but of careless or negligent driving. No alteration is suggested in the issue of driving licences.

AUTOMOBILE ENGINEERS' VISIT TO VANDERVELL'S WORKS.—On February 10 a party of graduates of the London branch of the Institution of Automobile Engineers visited the works of C. A. Vandervell and Company, Limited, at Acton Vale, W. After inspecting the stores they proceeded to the battery department, where making of batteries for the starting and lighting sets was watched throughout. The complete manufacture of motors and dynamos was then seen, and operations in other departments were witnessed. The machine shop and pressed tool departments, where pressers were turning out the numerous parts required for the firm's productions, were also visited.

MOTORS FOR MUNICIPAL ECONOMY.—The works committee of Deptford Borough Council have had under consideration the high and constantly increasing cost of horse hire, and found from experience derived from the use of motor lorries at present owned by the Council that for several branches of the highways department mechanical traction is less costly. The committee have been conferring with the finance committee with a view to the desirability of effecting a general transition to mechanical traction. The Council now have eight motor lorries, a gulley emptier, and a motor sweeping machine, and the conference of the two committees came to the conclusion that the change shall be effected gradually.

ASSOCIATED EQUIPMENT COMPANY, LIMITED.

In the report of the Underground Electric Railways of London, Limited, it is stated that in addition to the manufacture of motor omnibuses for the London General Omnibus Company, and for a large quantity of spare parts which that company requires for the upkeep of the fleet, the Associated Equipment Company has developed an important business in the manufacture and sale of commercial motor lorries. During the year ended December 31 last the company manufactured and sold chassis for motor omnibuses to the L.G.O.C. to the value of £630,901, commercial chassis to other customers to the value of £508,520, and spare parts to the value of £1,134,698. The factory at Walthamstow is capable of an average output of 45 chassis per week.

The price of the A.E.C. chassis remains, we understand, at the following figures—4-ton chassis, £1,300 and £1,328; K type chassis, £1,200. In some notes on the Glasgow Motor Show, in our issue of February 17, it was mentioned that several manufacturers had announced reductions in price ranging from £100 to £300, but the Associated Equipment Company should not have been included among them as they have made no alteration.

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THE Tramway & Railway World
WITH MOTOR TRAFFIC SECTION

Founded 1892. LONDON, APRIL 21, 1921. VOL. XLIX.

NOVEL DESIGN OF RECONSTRUCTED CARS AT NEWCASTLE.

PLATFORM ACCIDENTS ELIMINATED BY FRONT EXIT.

There are in operation at Newcastle-on-Tyne a number of single-deck front exit cars which merit the attention of tramway managers engaged in augmenting the capacity of their rolling stock, or in providing new cars. These cars, which are shown in the accompanying illustrations, have been reconstructed to the designs of Mr. Ernest Hatton, engineer and general manager of the Corporation tramways, and they present several original features. The first type of this vehicle—single-deck on bogie trucks—was illustrated in our issue of April 13, 1916, and for convenience of reference the illustration is reproduced in Fig. 2. The first change was a structural alteration providing a front exit, as shown in Fig 3. This car had a seating capacity for 37 passengers, but was reconstructed to carry a load of 55 passengers. As altered and shown in Fig. 3, it became capable of handling easily 80 passengers during rush hours. The reconstructed car gave very good results, as did several other experiments made by the general manager for dealing with the heavy traffic of the Tyneside shipyards at a time when car manufacturers were engaged on munition work, and tramway managers had to rely largely on their own resources for augmenting their rolling stock.

Early in 1916 Mr. Hatton had 60 single-deck bogie cars at work, and 40 of these he has now provided with a front exit, and to a number of them a top deck has been added. The original car is scarcely recognisable in the perfected type depicted in the illustrations in Figs. 1 and 4, but the initial effort was all that could be accomplished with the restricted facilities then available. The front exit, however, enlarged the carrying capacity and facilitated the loading and unloading of passengers. Before the change the car provided room for 37 passengers seated and 18 standing. When reconstructed and provided with an upper deck, the car was made to seat 38 persons on the lower deck and 28 on the top deck, while with 24 persons standing in the saloon as many as 90 passengers can be carried at rush hours. On the top deck standing is, of course, not permitted.

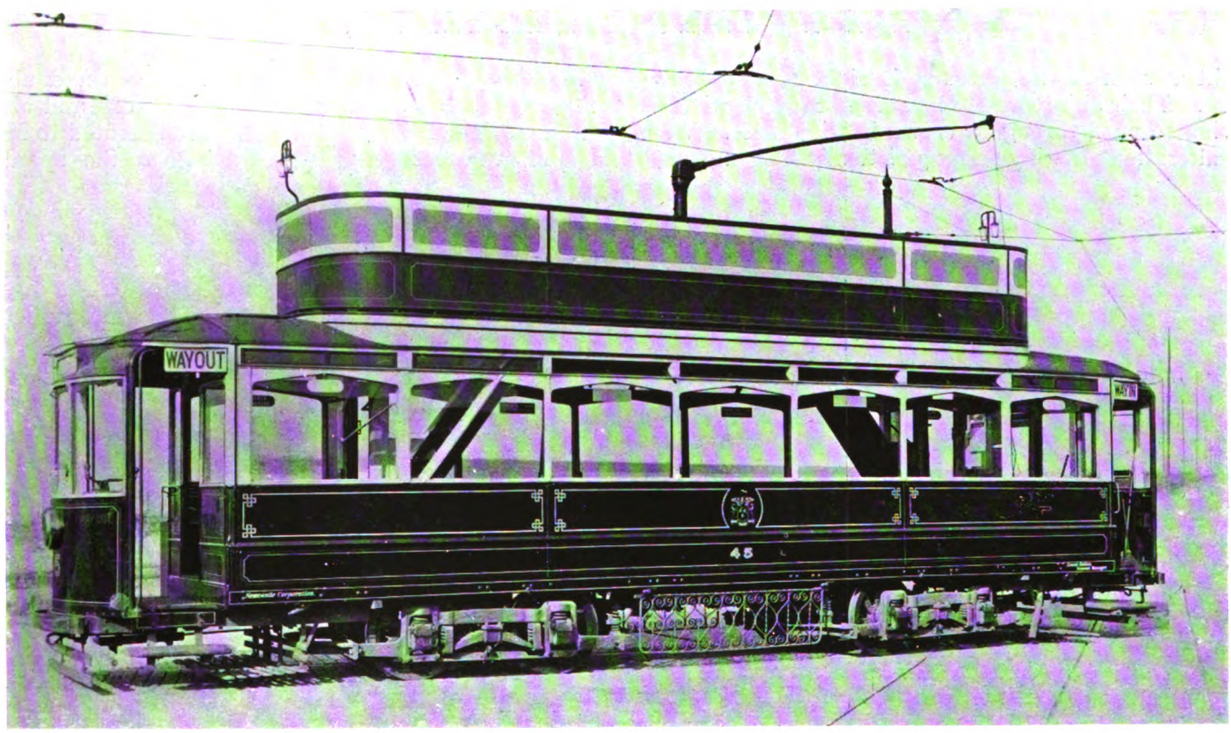

Fig. 1.—Reconstructed Car with Interior Staircases, Double Deck and Front Exit.

During the past five years the experience with front

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exit cars has confirmed what was said in our issue of April 13, 1916, with regard to the working. It was then remarked that in the old type of car the conductor was always troubled by passengers crowding on the back of the car or on his platform, ready to alight as soon as the car came in sight of a stopping-place. Their object was to be able to drop off without having to push through a crowd in the centre. With the alteration allowing passengers to alight at the front, they do not exhaust the advantages of the new design. The front exit largely does away with the crowds so commonly seen struggling to enter and leave the car at the rear platform, thus causing delay and exposing people to the risk of accidents from passing vehicles.

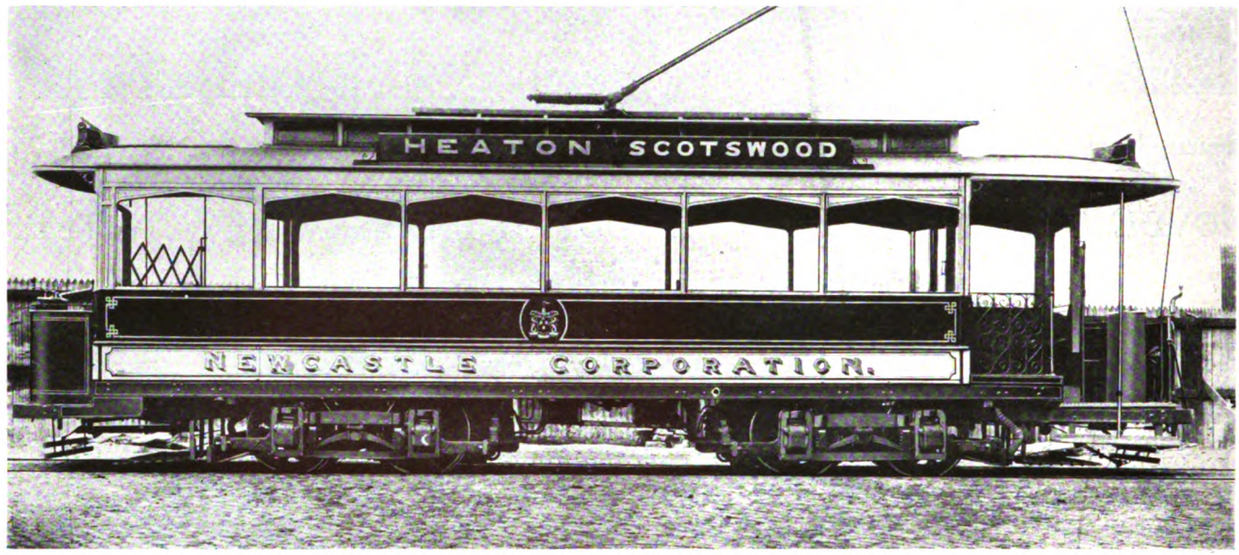

Fig. 2.—Original Form of Car with Rear Entrance only.

Figs. 1 and 4 give excellent side views of the double deck front exit car. For these photographs and also for an outline of the alterations we are indebted to Mr. Hatton, whose ingenuity in adding to the speedy

Fig. 3.—The same Car as Altered and Provided with Front Exit and Increased Passenger Accommodation.

the conductor always has a clear platform, while the car is more evenly loaded over both trucks and rides more smoothly. What is more important is that with the introduction of the front exit, car platform accidents have been unknown. These benefits are great, but running of the Newcastle cars and promoting the comfort of the travelling public is appreciated both by the Tramways Committee and the citizens. An inspection of the illustrations will show that the method adopted to prevent overcrowding on the rear platform

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consists of a shortening of the platform, the space thus gained being enclosed within the car body, and providing space for extra seats. This averts the injurious depression of the platform and the tilting of the truck, as the shortening of the platform not only permits a larger body, but gives, owing to the shape, a stronger body. The affixing of bold notices, "Way in," "Way out," to the rear and front platforms respectively serve to instruct even strangers to the city in the method of working.

The provision of vestibules on the platforms has popularised the new type of car with the employees. The half door or gate guarding the step of the front exit adds to the protection from the weather. This door is under the control of the motorman, and there is a similar gate on the off-side to prevent the possbility of a passenger getting off on that side. It takes more time to alight than to enter the car, and as the passenger leaves under the observation of the driver, he knows when it is safe to start the car even before the conductor gives the signal. This course, however, is not permitted, the crews having orders to adhere strictly to the rules. The absence of accidents is proof that in this instance familiarity has not bred contempt.

Inside of the enlarged body room is found for the improved straight staircase in the double deck cars, as seen in Figs. 1 and 4. The staircases in the position in which Mr. Hatton has placed them fit in well with the design of the car, and cause the least possible obstruction. Other effects of this innovation are that it prevents the platform being overloaded, and altogether does away with the risk of a passenger falling down an outside staircase into the roadway, either by pitching over the railings or by rolling off the platform. The staircase has been patented by Mr. Hatton, and it may be remarked that no other pattern of staircase could be incorporated in the design without obstruction.

Two other features may be noted. One is that the passengers' feet rest on a ledge slightly higher than the floor of the saloon, so that the conductor or persons passing through the car cannot tread upon protruding toes. Finally it may be stated that the top deck has been designed so as to avoid any overhang beyond the extreme wheel base of the car. The double-deck type has been named the "submarine" class, from the "monitor" roof seen in Figs. 1 and 4. It will be noticed that the roof has been cut away so as to keep the overhead height within reasonable limits.

In addition to the all-important fact of accident prevention, Mr. Hatton has produced a car giving very steady running, and one that is extremely popular, while it has provided ready means of increasing the passenger accommodation at considerably less cost than by the purchase of new cars.

The cost of the alterations and additions and the general renovation of the car has been approximately £300 per vehicle, and as the Corporation have 60 of these cars the total cost would be about £18,000. To provide the same increase in seating capacity by purchasing new cars at current prices would involve an outlay of approximately £90,000; and in addition the new cars would require more power plant and other accommodation, such as shed room, etc. The economy of this alteration is therefore plain, and the scheme adopted at Newcastle should be useful to any other authority owning a similar class of vehicle.

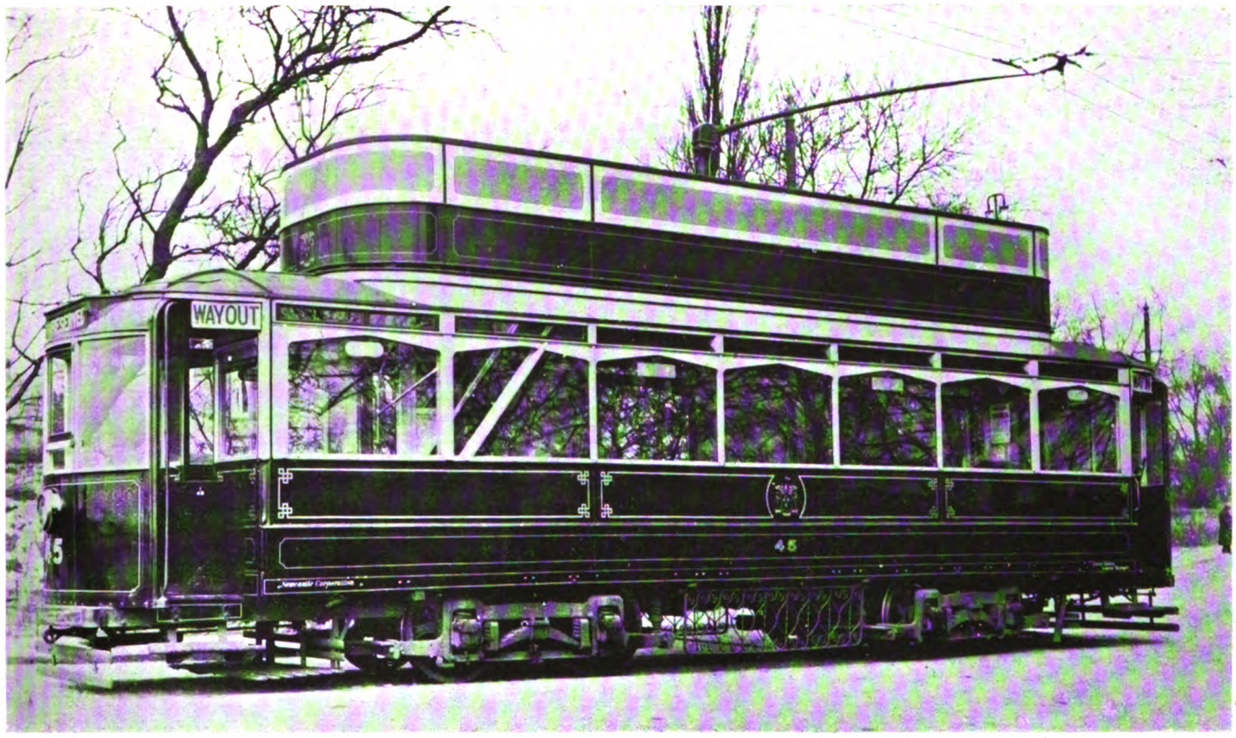

Fig. 4.—Showing Front Exit Gate Under Motorman's Control.

Leek and Manifold Railway Extension.—The proposed extension of the Leek and Manifold Valley Light Railway to Buxton was mentioned at the twentieth annual meeting of the company, held on March 30. Mr. A. J. Hambleton, C.C., of Leek, who presided, expressed the hope that the extension would be made in the near future. The Leek Rural District Council, he said, had recommended the extension to the Staffordshire County Council, and the latter had brought the matter before the Road Board, but he could not report the result. As a member of the County Council he would push the matter forward as far as lay in his power.

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BOURNEMOUTH TRAMWAYS.

DETAILS OF A NOTEWORTHY RECONSTRUCTION SCHEME.

Bournemouth Corporation Tramways Committee have entered upon a scheme of reconstruction of their undertaking on a scale comprising not only extensive relaying of the track, but improvements in other directions that will add to the efficiency of operation and to the convenience of the public. The plans were drawn up by Mr. I. Bulfin, the general manager, and the details show that he continues to be keenly alive to opportunities of progress, a spirit that has been a marked feature of the operative and financial aspects of the undertaking since he took up the management. The work he had accomplished, with his predecessor Mr. C. W. Hill, before devising the present extensive scheme had more than once earned the commendation not only of the Tramways Committee but of the members of the Corporation. This result is the more noteworthy in view of the fact that in one respect he had to contend with opposition. We refer to the conversion of the lines serving the chief business locality from the conduit system to the overhead trolley. Not without reason it was feared that the famous health resort might be injured in the eyes of visitors and prospective permanent residents. However, these anticipations have proved unfounded. Several years have elapsed since the change was made, and nothing but praise is now heard for the more efficient working at a lower cost. The results of the conversion have also proved useful to the Hastings and District Tramways Company in their efforts to secure the overhead system on the sea front.

To return to the reconstruction scheme, one prominent feature is a tramway centre, of a greatly improved lay-out, in the Square. This work, as well as that of relaying a considerable mileage of track in the town and outskirts, is being carried out to Mr. Bulfin's plans by Messrs. William Griffiths and Company, a firm which for many years during the life of the esteemed principal was identified with tramway construction in all parts of the country. With a continuance of the services of their indefatigable secretary, and with their engineers returned from war service, the company have entered upon a new era of tramway activity. During the night of February 26-27 the workmen, under the direction of the general manager and Mr. Ross, the company's engineer, removed a network of standards and wires at the Square. They then rearranged the overhead equipment on a simpler plan, with only four standards, and also entered on the task of relaying the rails nearer to the centre of the Square. By this alteration an additional width of from ten to fifteen yards is added to the roadway on each side, greatly to the benefit of motor and other traffic. In the centre an island refuge and loadieg station has been constructed, and when this has been covered with a light roof, as it undoubtedly ought to be, the Square will be an ideal tramway centre. This reconstruction was completed by Easter. To appreciate fully the importance of the improvement it is desirable to see a photograph of the Square before the alterations. In the centre, between the up and down tramway tracks, was a large circular grass plot. This was fenced in, and fulfilled no useful purpose. Much of the plot has been cut away, thus enabling the roadway to be widened and the tramway tracks to be straightened. The reconstructed tracks are now close to the enclosure in its new form of a loading station and refuge. Fig. 1 illustrates the new tramway centre just as it was approaching completion.

Fig. 1.—Improved Lay-out of Tracks at Bournemouth Tramway Centre.

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An ingenious idea for covering a queue enclosure is depicted in Fig. 2. This queue for passengers to Moordown and Holdenhurst Road is at the foot of Richmond Hill, abutting on to the Square. It is a cheap form of construction of angle iron and tie-bars and old bracket arms. The glass roof rests partly on the standards and partly on the adjoining wall. At this point there is at times a rush of traffic, and a shelter was greatly needed. The traffic has been much more efficiently dealt with since Mr. Bulfin demonstrated that bogie cars can be safely operated on the hill, which has a gradient of 1 in 12.

On the occasion of our representative's visit to several places where reconstruction and extension work are in progress, he had opportunities of judging of the great utility to the tramways of Tilling-Stevens' petrol-electric omnibuses, tower wagon, and a lorry. On the Ashley Road section he observed an omnibus in use for the transference of passengers from the cars for conveyance beyond a stretch of the line now in course of reconstruction. This mode of reconstruction is, we believe, peculiar to Bournemouth. It has been used on all reconstruction work for the last eight years. The old rails, as taken out, are turned into cross sleepers 5 ft. 4 in. long, and clipped to the new rail every 5 ft. Between these cross sleepers are the ordinary tie-bars, each 5 ft. It will thus be seen that there is a tie every 2 ft. 6 in. on the whole of the running rails, the result being a thoroughly rigid line. The method of fastening the sleeper to the underside of the new rail was redesigned by Mr. Bulfin. It comprises an iron clamp and an iron wedge, the patent clips being made by Messrs. Wm. Warner and Company, of Nottingham, who are the patentees. Two clips and wedges are hammered on simultaneously at one end, and each sleeper is held by four clips. That they remain immovable was seen on an inspection of an opening on the Ashley Road track. To accomplish the opening-up the concrete foundation covering the seat of the rails had been broken up, causing clamps to sustain a great deal of hammering without injury or loss of rigidity.

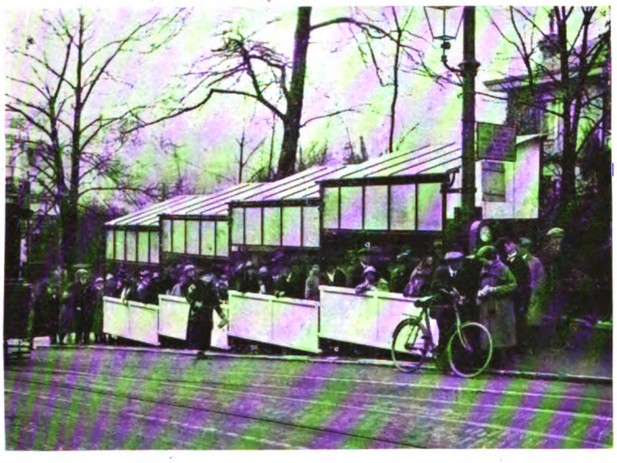

Fig. 2.--Sheltered Queue Over Pavement.

Fig. 3 depicts the old rail sleeper attached to the new rails, and also the use at places where the subsoil is soft of the B.R.C. reinforcing fabric. The Ashley Road section, it may be added, serves the extensive cricket and football grounds and children's play centre provided by the Corporation.

The visit to the various sections was made on a Tilling-Stevens lorry, the front of which has a glass screen from the canopy to the dash. Besides doing a great deal of haulage work for the tramways, this lorry is of great service to Mr. Bulfin himself, enabling him speedily to visit any part of the extensive undertaking. As for the tower wagon, he cannot speak too highly of its usefulness, which, of course, embraces welding by electric power without having to make a connection with the overhead wires. The general

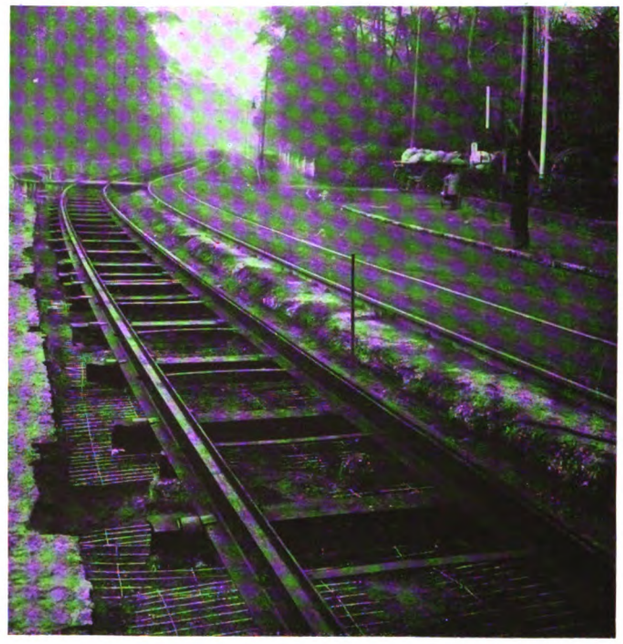

Fig. 3.—Track Relaid on Disused Rails Cut into Sleepers.

manager has even sent it to a Corporation depot to do a welding job on a steam roller. Another use to which our representative saw it put was the conveyance of a very heavy overhead wire standard from the Square to the car shed, the rear end resting on a rail trolley.

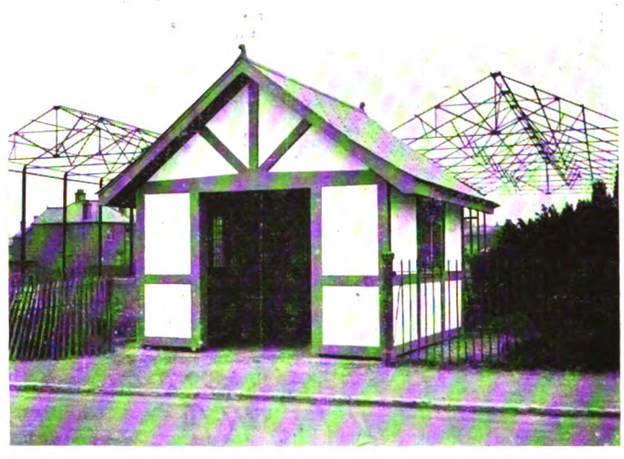

Fig. 5.—Passenger Shelter with Framework of Old Rails.

The section running to Moordown terminus, car shed, and golf course is of interest because of the fact that the rails of the double track are laid on sleepers cut from discarded rails, as already described at Ashley Road. The Moordown track was constructed on this method at a cost of only £6,000 per mile.

Another interesting use for old rails is indicated by Fig. 4, which shows the framework of a car shed in

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course of erection by Mr. Bulfin for the accommodation of some of the twenty new cars on order, delivery of five of which was expected by Easter. He adopted this course in consequence of the existing restrictions and prices in connection with building material and construction. The shed is 121 ft. 6 in. by 110 ft., in two bays of 35 ft. and one of 40 ft. All the stanchions are old rails that have been pulled out and straightened. By the side of the shed is a shelter for passengers (Fig. 5). This has been erected by the Tramways department at half of the estimated cost of outside aid. Its framework consists of old rails encased in Eternit panels and tiles and wood framing. At the base there is an aperture of three inches between the walls and the floor, which is grouted and floated, to enable it to be thoroughly cleansed.

The contract for the rails for the present work was given at the end of 1919 to Messrs. Bolckow, Vaughan and Company, of Middlesbrough, for the supply of 2,200 tons of B.S.S. No. 4, 4c, and 3c rails. These are of Sandberg's patent silicon steel, and the price accepted was £20 10s. per ton at their works in Middlesbrough. Practically the whole of these rails have been delivered, and a large quantity are already laid, while the cars are running over some.

Messrs. Griffiths and Company, of Bishopsgate, London, are carrying out the whole of the reconstruction work, their tender working out at between £18,000 and £20,000 per mile of single track, including wood paving. Captain Ross, R.E., acting as resident engineer for Messrs. Griffiths in Bournemouth, is responsible for carrying out the work under Mr. Bulfin's directions.

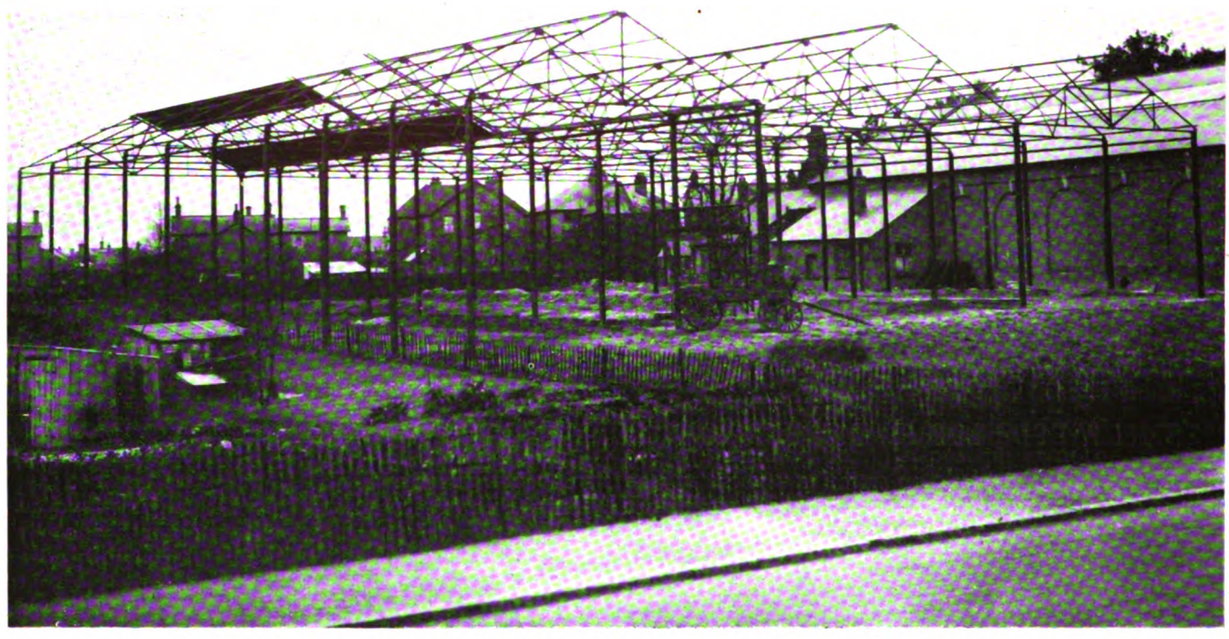

Fig. 4. Old Rails Used as Stanchions for New Car Depot at Moordown.

American Railway Losses.—American railways are said to be rapidly approaching a crisis. So far from yielding a fair return to their owners, which was promised in last year's Transportation Act, a large number of them are not even earning their expenses. Over 400,000 goods cars are idle and earning no revenue. In each of the last four years although gross earnings increased over those of the previous year, the net earnings decreased.

AMERICAN TRAMWAY SHOPS.

That the maintenance shops of electric railways in the United States of America are undergoing "a gradual but very noticeable evolution" is the opinion of the *Electric Railway Journal*, of New York, the annual maintenance number of which has reached us.

"The changes which have been brought about are due to many causes, not the least of which is the improved quality of equipment supplied by manufacturers," the article says. "While it is true that some of the older equipment has made wonderful records for durability, the new equipment is superior in most characteristics. Take, for example, the motor. In this case the designers, by reducing weight, increasing overload capacity, eliminating sparking, etc., have put the modern motor in a class quite distinct from that of its predecessor. The manufacturers deserve credit for this achievement, although they have undoubtedly been influenced by complaints and constructive suggestions from their customers. Along with better motors have gone also better car bodies, trucks, controllers, heaters and the hundred and one details which go to make up a complete car.

"The master mechanic comes in for a large share of the praise for improved shop practices in that he has recognised the opportunities afforded by new developments. For instance, he now dips and bakes armatures and field coils, where he did not deem this necessary or practicable some years ago. In one case at least he is dipping and baking the entire motor shells with field coils in place. Possibly in addition he is using an impregnating outfit in connection with his insulation programme. He is slotting his commutators also, and he is certainly using better tools and adapting the tools to the work more skilfully than ever before."

Alluding to reclamation work, the journal says the possibilities of electric, gas and thermit welding, and of gas and electric cutting, are limitless.

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THERMIT WELDS FOR HAMMERED JOINTS.

With rails at their present high price there is no need to emphasise the importance of any system that will avert the need of substituting new rails for the old rails in which fish-plate joints have to a large extent become hammered. To the many tramway undertakings that now find themselves faced with the problem of renewing rails with sunken joints that are playing havoc with the cars and track, the news that treatment by Thermit welding has proved efficacious will come as a great relief.

The success of Thermit, Limited—now a subsidiary company of Nobel Industries Limited—has long been known in the welding of new tracks and tracks where complete reconstruction is in progress, but the outbreak of the war interfered with the company's development of an improved system of imparting new life to old lines in which fish-plate joints have become defective. In Dublin and Southampton, such joints treated by the Thermit system seven years ago have given very satisfactory results, and a similar system of treatment has recently been carried out at Belfast and Bath.

Thermit, Limited, are now engaged upon an extensive renewal of the Bournemouth Corporation lines by welding dished-joints as part of a reconstruction scheme embracing twelve miles of the tramways. A representative of this journal recently had an opportunity of inspecting the work in progress on the track between the car depot and the Central Railway Station, where the rails have been in use for twenty years. Workmen of Thermit Limited, were there engaged in operations that entail the minimum of disturbance of the permanent way while giving the rails treatment that ensures a long renewal of usefulness.

With the Thermit system it is only necessary to remove about one yard of paving at each joint selected for treatment, and in the majority of cases one single

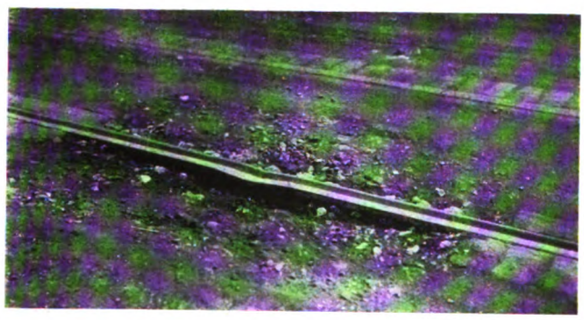

Fig. 1.—Showing Defective Fish Plate Joint Before Treatment.

Thermit weld is all that is necessary to effect a satisfactory repair. At joints, or where the rail heads are cracked, due to a bad "dish," a closure of about 1 ft. 6 in. to 2 ft. in length is inserted to replace the defective rail.

Taking the case of a single weld, the first step is the fixing of a small casting or clamp upon the rail heads in order to hold the rails in alignment while being forced apart by means of a steel vertical wedge, which is driven in between the rail heads. The clamp contains a screw at the end of which is a collar slotted to receive a horizontal wedge forced between the rail webs after they have been opened by means of the vertical wedge. These operations are repeated until the ends of the rails are opened sufficiently. The vertical wedge is then removed, and the space between the rail-ends filled in by means of a copper-coated "shim," whilst the rails are being held apart by means of the wedge in the webs; this wedge is afterwards removed, leaving the joint under pressure. It is necessary with this process to raise slightly the receiving

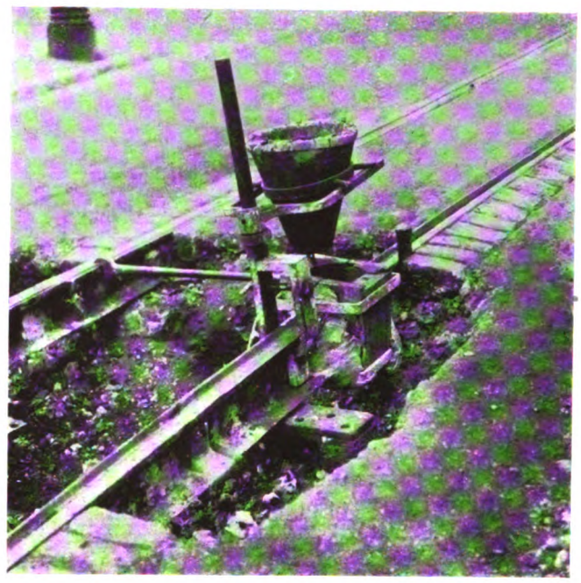

Fig. 2.—Hammered Joint Removed, Short Closure Inserted, and Thermit Weld Made.

rails, so that when the joint is filed after welding a true running surface is assured.

The actual welding of the joints is similar to the ordinary Thermit process, that is to say, a pair of moulds are fixed on the joint to receive the Thermit metal which is run from a crucible placed above the moulds. In this way the rail heads are heated, so that

Fig. 3.—The Thermit Joint Made and the Track Repaired.

the pressure brought to bear upon the joint by the rails being forced apart effects a butt-weld. When finished, these joints present exactly the same appearance as the joints welded on new rails.

Mr. I. Bulfin, the general manager of the tramways, as already indicated, has arranged for a considerable number of joints on the Bournemouth track to be treated by the Thermit system, and so far the work carried out has been very satisfactory, and should greatly prolong the life of the present rails and ensure smooth running.

Five photographs will serve to indicate the nature of the operation. Fig. 1 shows a defective fish-plate

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joint before welding. The setts have been removed and the rail sawn through so as to insert a closure.

In Fig. 2 the hammered joint portion has been removed, the short closure introduced, one Thermit

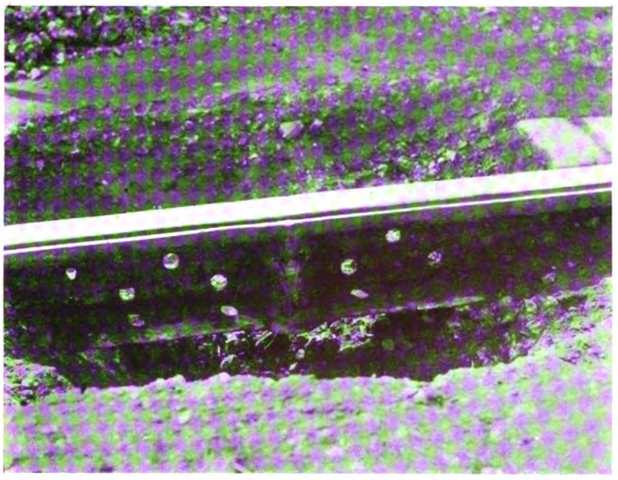


Fig. 4.—Completed Single Weld.

joint already made and the crucible and mould placed in position for the making of the second joint.

Fig. 3 illustrates the joint made, the closure in position and the track repaved.

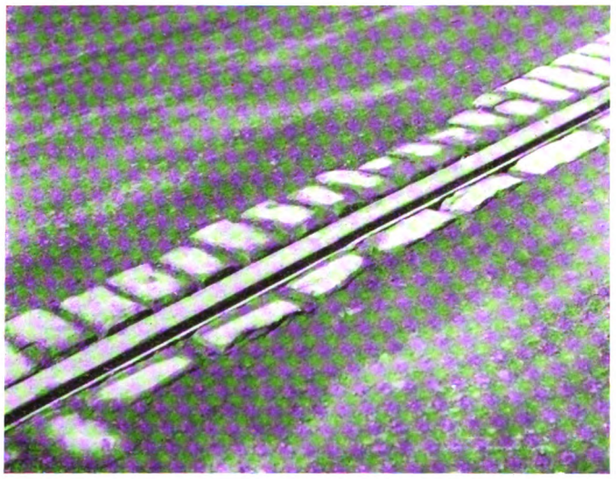


Fig. 5.—Same Joint as Above With Roadway Completed.

In Fig. 4 a completed single weld is shown before the roadway has been restored. In Fig. 5 the same joint is shown with the roadway completed.

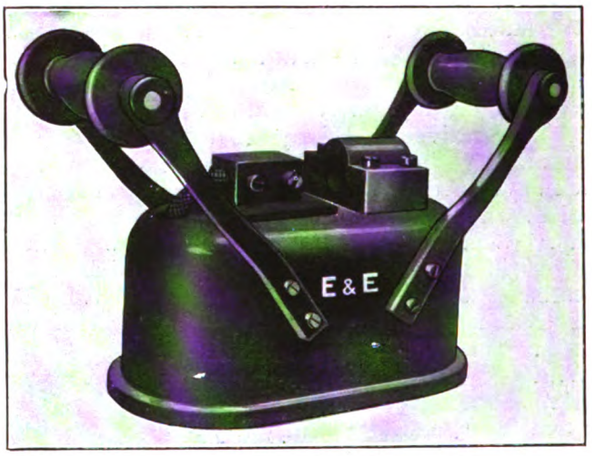
Standardising Plymouth Car Equipments.—At a meeting of Plymouth Tramways Committee the proposals of the engineer and manager (Mr. H. P. Stokes) for standardising car equipments were approved. The manager proposes to replace obsolete and unsuitable types of electrical equipments on 26 cars and to redesign other types with a view to re-standardising the whole of the electrical equipment to an up-to-date design.

Keighley and a Speed Limit.—At a Ministry of Transport Inquiry on March 31 into Keighley Corporation's application for a 10-mile speed limit for the three main roads, for both local and through traffic, Mr. Kent, chairman of the Bradford Automobile Club, in opposing the application said that tramcars were continually running at over 10 miles an hour; on some portions the speed was often as much as 18 miles per hour. Mr. J. A. Bromley, general manager of the tramways, gave evidence that it was impossible for a car to run at 18 miles per hour, as had been alleged, though downhill it might do. The maximum speed on the level was 14 or 15 miles per hour. The average speed, including stoppages, was 6·87.

EARTH CONNECTIONS.

Their Use in Tramway Track Work.

There are many instances in practical tramway work where an earth connection is required to the rail for the use of an electric welding plant, a grinding attachment, portable lights, or other purposes, and rough and ready methods are often resorted to in order to gain the connection. We have even seen an iron spike driven into the sets against the rail for this purpose. It is easy to understand that with such methods damage to the rails—to say nothing of trouble which may occur upon the apparatus used—is likely to arise. Somebody trips over the cable connected to the attachment, with the result that the connection is broken. Frequently it is then remade without any consideration being paid to the apparatus taking current. If this is a motor of any description, the chances are that it has considerably slowed down in speed, although the handle of the starting switch may not have automatically come to the "off" position, with the result that if the contact is re-made at the



Magnetic Earthing Block.

rail a large current will flow with possible damage to the machine.

In this connection the magnetic earthing block made by the Equipment and Engineering Company, of 2-3, Norfolk Street, London, W.C.2, will appeal to all users on account of the facility with which it makes connection to the rail, its small size, and the impossibility of breaking the connection while the current is flowing. The device is shown in the accompanying illustration, and consists of an electro magnet energised by the current coming from the motor or other device requiring current.

This was primarily designed for use with the electric welding plants supplied by this firm, but has since been used for other purposes, particularly in connection with grinding attachments. The block can be wound to suit any current required, and when placed upon the rail has a magnetic hold of such force that it is extremely difficult to remove it without first switching off the current. There is no possible chance of arcing between the block and the rail, so long as the current is maintained, while vibration will not result in chatter leading to sparking.

York Watch Committee have fixed charges for the use of the motor ambulance at 5s. within the city and 1s. 6d. a mile (minimum 15s.) outside.

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THOMAS PATENT RATCHET LOCKING DEVICE.

Some time ago we illustrated and described a novel device patented by Mr. Sidney Thomas, managing director and engineer of the Peckham Truck and Engineering Company, Limited, of Audrey House, Ely Place, London, E.C.1, in connection with an improved method of releasing the "dog" or "pawl"

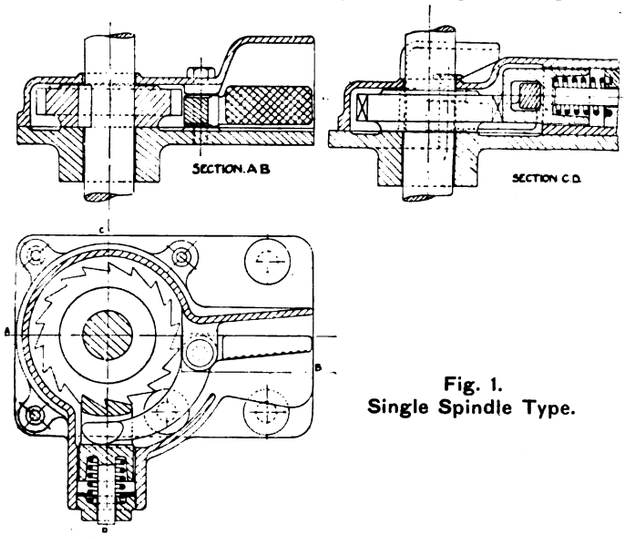

Fig. 1.
Single Spindle Type.

at the bottom of the brake spindle. One type of this new device was shown. It consisted of the usual ratchet wheel, keyed on to the brake spindle, but instead of the teeth being on the side or edge of the wheel as at present, they were shown on the top, and were of the "rack" type. Engaging in this wheel was a four-tooth dog-wheel or pawl, which was held in position by a coil spring surrounding the brake spindle, and prevented from rotating by projections which engage lugs on the inside of the casing. To apply the

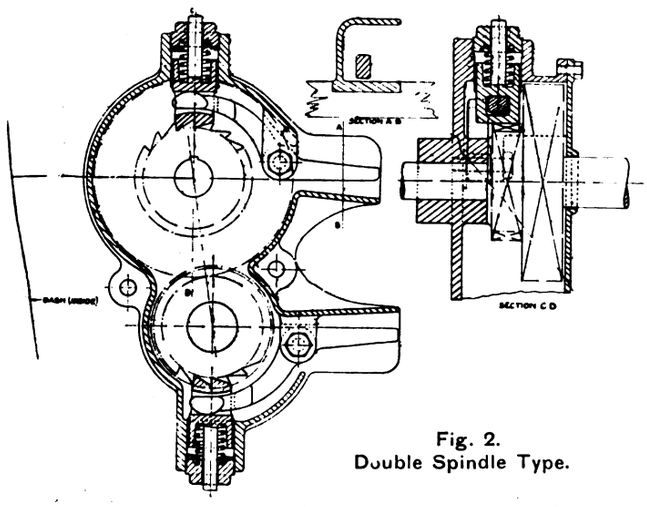

Fig. 2.
Double Spindle Type.

brake on a car fitted with this new device, it was only necessary to turn the brake handle and the top wheel or "pawl" automatically held the brake gear in the "on" position. A foot pedal (almost flush with the floor) operated a fork, which lifted the wheel or pawl free of the ratchet wheel, thereby allowing the brake gear to be released.

We have now received another design of this gear which is operated by kicking the pedal sideways, as is the practice at present. This is designed to overcome the objections of some of the managers that with the device shown in our previous issue the movement was new to the drivers and would perhaps result in accidents. All this gear is encased in a dust-and-grease-tight box, which ensures protection from dirt. This fitting can be adapted to suit the double spindle type brake gear largely used on various tramways. Fig. 1 shows this device fitted to a single spindle and Fig. 2 illustrates it as fitted to a double spindle.

It is claimed that this brake ratchet enables the driver to apply his brakes more quickly and to "feel" the brakes better, thereby reducing the wear and cost of brake shoes and wheel tires, and also preventing skidding of wheels. In case of emergency the driver can devote his entire energies to applying the brake, without having to worry about engaging the ratchet dog and pawl with his foot, as at present. Since the ratchet wheel is held by two ratchet dogs or pawls instead of one, as at present, the risk of the brake gear being released through wear is reduced. The foot pedal is provided with a cover to prevent passengers treading on it, thus releasing the brake gear when the car is at rest. The ratchet device thus presents very marked advantages over the existing type and it is anticipated that it will be widely adopted for tramway hand brakes. We are informed that the Peckham Truck and Engineering Company, Limited, gladly supply sample car sets on application.

POWER DEVELOPMENT SCHEMES.

The scheme in Great Britain for the development of electric power finds a replica in the plan for a great region in the North-eastern United States. Legislation has been passed for dealing with a territory from Boston to Washington, averaging 150 miles inland, and comprising some 60,000 square miles. Mr. W. S. Murray, chairman of the super-power survey of the United States Geological Survey, in a paper on the subject, stated that in this area there was a demand for 17,000,000 horse-power, of which 10,000,000 would be for industries and 7,000,000 for railways. Through the application of the comprehensive plan contemplated the load factor could be lifted from its present value of 15 per cent. to 50 per cent. One horse-power could be made to do the work of three, and one pound of coal of two. It was proposed to deliver power to a great transmission and distribution system, fed by high-power, high-economy, steam generating stations erected at points on tide-water and at mouths of mines. Added to such a supply would be that obtained from the great rivers of the territory. The trunk transmission system would be common to all these sources of power as well as to the great central stations now built at Boston, New York, Philadelphia, etc. About 2,700,000 KW. would be provided above that now existing. A saving of 30,000,000 tons of coal per annum was a conservative estimate for this zone.

Tees-side Tramways.—On April 2 the Tees-side undertakings of the Imperial Tramways Company, Limited, were taken over by the Corporation of Middlesbrough, Stockton, and Thornaby. It is expected that several improvements and alterations in the tramway and omnibus services will result. With regard to the latter, three new routes on that portion of the undertaking for which the Corporation of Middlesbrough is responsible have been arranged. These will serve Seaton Carew, Haverton Hill, and Grove Hill. The Seaton Carew route will be run jointly with the West Hartlepool Corporation, while the Haverton Hill service is intended to connect with the projected Middlesbrough Corporation ferry across the Tees at Billingham.

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THE EDITOR will be glad to consider articles by experts. All information of a practical character relating particularly to the engineering and operating branches of transportation will receive prompt attention. Original illustrations will also be welcome.

LONDON, APRIL 21, 1921.

Front Exit and Economy. Whether managers are ordering new cars or are using their own resources for building additional rolling stock or for renovation purposes, the present juncture affords an opportunity for considering the economy that may be achieved by adopting the front exit. As appeared from articles in recent issues, describing the new cars for Belfast and earlier for Huddersfield and other places, there is no difficulty in fixing the staircases in positions suitable for front exit working. With single-deck cars this method is universal in the United States and in the Dominions, while in the former country double-deck vehicles have been provided with central entrances and exits. To the mind of a novice it must be apparent that a good reason exists for this separation of two opposite streams of passengers, and apart from the abolition of this confusion, there is another consideration that presents itself to the traffic manager. It is that speedier loading and unloading gives an improved running schedule. Before leaving the quicker loading aspect, it will be reasonable to consider the possibility that a Parliamentary Committee may, in the near future, relegate to the Ministry of Transport the task of deciding whether tramway authorities do all that is possible to prevent their operations becoming an obstruction to other traffic at busy stopping places. Such an outcome may well arise from Manchester's pending application for power to require other vehicles to halt at car stops. In that event the inadequate means of entrance and exit will attract attention, and reference to the files of the tramway inspectorate under the Board of Trade will show that front exit cars were approved years ago. That their successors are in agreement with that attitude is clear, since Major Hall, one of the present inspectors of the Ministry of Transport, has seen both double and single-deck front exit cars in service at Newcastle-on-Tyne, and expressed strong approval of their utility on the occasion of his visit in October last to investigate complaints of over-crowding during the rush periods. In any such inquiry by the Ministry of Transport the question of platform accidents is likely to claim attention. Investigation will reveal that such mishaps are an inevitable consequence of the use of one platform for both purposes, and that these accidents entail expensive compensation. When the Ministry come to inquire what has been the experience with front exit cars, they will learn that Newcastle, during five or six years' operation, has not had one platform accident with its front exit system, which is now in use on some sixty cars. This result is emphasised in the information given in this issue by a representative who recently visited Newcastle. In this time of financial stringency tramway managers will be interested in the details of the economy which Mr. E. Hatton has achieved in his treatment of sixty bogie truck cars, many of which have been converted into double-deck vehicles, while every car has been adapted for front exit working.

Street Accidents. It might be imagined that the familiarity of the public with the ever-present danger of the streets in these days of dense traffic would of itself be almost sufficient to prevent some, at least, of the large number of accidents that occur annually, but the official return which was recently issued shows there is still much room for care and vigilance on the part both of the pedestrian and the vehicle

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driver. The subject is a difficult one to approach, and it is almost impossible to dogmatise as to the actual causes of the 57,000 accidents in the United Kingdom last year. The White Paper itself, though very instructively detailed as regards figures, gives no clue, of course, as to the specific liability for the accidents, and it is evident that the blame—where there is blame—must be variously allocated. One thing is certain, however, in view of the fact that the number of accidents throughout the country increased by over 6,000; more and more forethought and persistent care must be exercised by everyone using the public thoroughfares—pedestrians and drivers of vehicles alike. The Safety First Council has undoubtedly done much useful work with its slogans and propaganda disinterestedly published for the general welfare, and it is practically certain that the figures we have noted would have been much worse had it not been for the Council's efforts. As will be seen from the tables reproduced in another column, showing the respective classes of vehicles concerned in last year's accidents, tramway cars are by no means the worst offenders. Out of the 2,837 accidents in the United Kingdom, only 196 involved tramway cars, while omnibuses were responsible for only 189. Horse-drawn vehicles were concerned in 370, other vehicles in 1,908, and pedal cycles 174. The tramway car figures show the slight increase of nine over the previous year, while those of the omnibuses have decreased by twenty-two. As we have said, these figures do not necessarily imply blame on the part of the drivers concerned, but merely indicate that their vehicle was involved. One of the most frequent risks attendant on tramway travel is that to which passengers are exposed when boarding or alighting, and in this regard it is comforting to note that the Manchester Corporation have succeeded in retaining in their Parliamentary Bill the clause requiring vehicles, on reaching stationary tramway cars, either to stop or pass on the off-side. That the people of Manchester support their Council there can be no doubt. Any legislation which tends to make safer the use of the streets and of the tramway services, which form so essential a part of life in the larger towns, must command the cordial support of all thinking people. But it is in London that the problem of the streets lies heaviest. Last year the number of fatal accidents in the Metropolitan Police District and the City of London together worked out at nearly two each day. Although this is serious enough in itself, the vast volume of traffic from which these figures are taken must not be overlooked, and from this point of view they indicate that driving and control in the Metropolis have reached a high level of skill, smoothness, and efficiency. For the further improvement in these returns which is still possible and which all concerned are in duty bound to attempt, there is one sure recipe—Safety First!

More London Circular Routes.

The London County Council Tramways management are to be congratulated upon having discerned that the Victoria Embankment is capable of being utilised in a manner that will speed up the whole of the southern area traffic. This possibility became apparent soon after the running of trailers on several circular routes. The effect was seen in a lessened use of the Blackfriars queues set apart for the circular routes, many passengers preferring to pay the extra penny and traverse the Embankment rather than see car after car pass the enclosures full up. Although the Embankment charge has since been increased by one-halfpenny, numerous people using the circular cars still board them at stops other than the queues. The management have now recommended that additional circular routes be instituted, and passengers be picked up for all circular services at any point on the Embankment, without requiring payment of the additional three-halfpence. Under the new system of working, only two services will be turned at Waterloo Bridge, the midway point on the Embankment, while at Blackfriars there will be no shunting at all. The benefit of a similar freedom from turning will also be given to the cars coming to Waterloo Bridge from Westminster. Over four hundred cars will be affected by the change, and with the prevention of loss of time and obstruction there will be a speeding up on all routes south of the Thames. By this adjustment 130 cars instead of 90 cars an hour will run along the Embankment, and during the rush period there will be a car running in each direction every half

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minute. By allowing passengers to travel home by the longest route for the same fare as on the shorter route much waste of time will be avoided to the public as well as to the various services. A commendable feature of the institution of four additional circular routes is that a serious grievance arising from the recent increases of fares will be remedied. At present passengers on some of these routes desirous of reaching the Embankment at Westminster have to change and pay an extra twopence, as against a fare of fourpence and twopence at the midday period on the through cars. This grievance has been accentuated by the granting of transfers between cars and omnibuses at a saving of a halfpenny on the Victoria route. On the cars owned by themselves the ratepayers lost the advantages of transfers as a measure of war-time economy. Before its abolition the transfer system was made an important means of meeting competition, and on more than one occasion during the present year suggestions for its restoration have been made at meetings of the County Council.

Non-Stop Services. What is apparently an innovation on the part of a tramway undertaking is sought by the Dundee Corporation in the following clause of their application to the Secretary for Scotland for a Provisional Order embracing various objects. The clause reads, "To authorise and empower the Corporation to run through cars along any of the routes of the tramways under such circumstances and subject to such terms and conditions as the Corporation may think fit or the Order prescribe." In circles other than tramway management the non-stop car has often been advocated, but the advocates seem to have given little attention to the difficulties of the proposal. During the war the need for exercising economy led to a wide resort to the cutting out of numerous optional stops. That course could still be continued with advantage on provincial tramways that have no opposition to contend with, but it is only on sections where cars have a liberal headway that non-stop running could be resorted to. The difficulty presented by a line being used by cars from two places need not be insurmountable. Probably only a single service prevails on the routes where the Dundee management desires to introduce non-stop cars. It is of interest to note that Mr. F. Pick, an assistant managing director of the London traffic group, in a paper which he presented to a conference of Electric Railway Associations in the United States, suggested that non-stop running might with advantage be tried in London, and he expressed the view that the omnibus would be the most suitable vehicle to use for pick-up traffic in a test with a non-stop car. Most experts will probably agree that the omnibus would be the most suitable vehicle to use on a non-stop schedule, owing to the ease with which it could avoid being held up by other traffic. Moreover, a tramway car could not be so operated without legislative sanction. The most suitable locality for the experiment would be one of the least used sections of the group's undertakings, for competition exists between their cars and omnibuses, and the rivalry is not altogether to the liking of the tramway administrators. Two years ago, at the annual meeting of the group's tramway companies, the chairman expressed a desire to experience less of this competition. Certainly the group has been long enough in existence to have co-ordinated their traffic to the fullest possible extent, and it would be interesting to learn what additional progress has been made in that direction between the omnibuses and the London United and Metropolitan Tramways.

INCREASED FARES IN AMERICA.

A report by a committee on systems of fares based on returns from 48 electric railway companies has been presented to the American Electric Railway Association. The general facts are interesting. In almost all cases when an increased fare was first put into effect there was a decrease in the number of passengers. Due to the higher rate, this decrease was not, however, sufficient to prevent an increase in revenue. As time went on, and the patrons of the companies became accustomed to the higher fares, the volume of riding increased; and it is the opinion of many of the executives of the companies that they have won back practically all the riders lost in the beginning. The committee came to the conclusion that for a large number of cities a fare of 10 cents would not decrease the riding habit sufficiently to prevent the obtaining of needed increases in net revenue, and that in very many cities this 10 cent fare is absolutely necessary for adequate service and restored credit. Previously the fare has generally been five cents.

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LONDON UNDERGROUND RAILWAYS.

NEW SCHEME OF ORGANISATION.

At the end of February the combination of London traction interests, often called the Underground group of companies, issued particulars of a new scheme of organisation for the administrative staffs which is of considerable interest. As compared with the hitherto existing organisation, there seem to be various changes in regard to allocation of duties, and—as indicated by Lord Ashfield at the recent annual meetings of the companies—opportunity has been taken for the promotion of officers showing ability. He also expressed the belief that the new arrangements would lead to increased efficiency and economy. The organisation embraces the following companies—

The Underground Electric Railways Company of London, Limited (referred to as the Underground Company).
- Metropolitan District Railway Company.
- London Electric Railway Company.
- City and South London Railway Company.
- Central London Railway Company.
- London General Omnibus Company, Limited.
- (The above five constitute the Common Fund Group.)

The London and Suburban Traction Company, Limited (referred to as the Traction Company), including—
- Metropolitan Electric Tramways Company, Limited.
- London United Tramways Company, Limited.
- South Metropolitan Electric Tramways and Lighting Company, Limited.

The general arrangement set out shows that there may be a single chairman and managing director for the Underground Company, each of the companies in the Common Group Fund and the Traction Company, but there shall be separate and distinct chairmen for the Common Fund Companies, and there may be separate and distinct chairmen for each of the companies in the tramways group. Provision is also made for the meetings of the various boards, and the constitution of finance and standing joint committees. The finance committee includes, in addition to the chairman, three members nominated by the Underground Company and one by the Traction Company, while the secretary and treasurer to the Common Fund Group and to the Tramways Group shall attend the meetings. The standing joint committee includes the chairman and managing director, and members nominated one by each of the four railway companies, two by the London General Omnibus Company, and two by the three tramway companies jointly, together with two specially appointed all-time directors. The secretary of this committee is to be an independent officer attached to the chairman's office, and the general manager (tramways) and other directors and principal officers of the companies may be invited to attend where their presence will assist consideration of matters before the committee.

A panel of 12 directors, including the chairman and managing director, is appointed for the review of—(*a*) Contracts for construction and other important works; (*b*) purchases; (*c*) claims settlements; (*d*) receipts and payments; (*e*) staff welfare work; and (*f*) such other special duties as the chairman may direct. The panel will be constituted of the chairman with five directors from the railway companies, three directors from the London General Omnibus Company, and three directors from the tramway companies. Each year the directors on the panel will be allotted to specified offices for the purpose of carrying out the review of the work indicated above. The boards of the Common Fund Group of companies will include directors devoting their whole time to the service of the companies, as follows—two to have the title of assistant managing director, who shall be members of all the boards for the assistance of the chairman, and who shall be engaged upon the management of the undertakings; one to have the title of director of construction (railways), who shall be a member of the four railway boards, and shall be engaged upon new construction and development.

For the purpose of securing co-operation the chairman and the two assistant managing directors in charge of departments A and B (and the general manager of tramways when questions affecting the tramways are being discussed) are to meet regularly for the settlement of questions of administration and for the consideration of questions of policy.

DEPARTMENTS.

A schedule setting out departments in organisation shows the following details—

DEPARTMENT A.—In charge of an assistant managing director.
This department is charged with responsibility for—
- (*a*) The accounting, audit, and statistical work (Common Fund Companies).
- (*b*) The determination of fares, rates and charges.
- (*c*) The development and establishment of routes and services and the co-ordination of traffic facilities.
- (*d*) The publicity and advertising.
- (*e*) The purchase and supply of stores and materials; and the sale of obsolete stores, spare parts, and scrap.
- (*f*) The legal and Parliamentary work.
- (*g*) Negotiations, arrangements, and agreements (subject to any directions of the chairman).

DEPARTMENT B.—In charge of an assistant managing director.
This department is charged with responsibility for—
- (*a*) The inspection, adjustment, cleaning, and oiling of the rolling stock, lifts, and escalators of the railways, with the supervision and control of the depots, yards, and sidings.
- (*b*) The operation of the railways and control of stations.
- (*c*) The supervision and control of the motor omnibuses, with the garages and sheds.
- (*d*) The operation of the system of motor routes and stands.
- (*e*) The preparation and institution of all service and duty schedules.
- (*f*) The work of the chief passenger agent, including the supply and issue of tickets.
- (*g*) The settlement of claims arising out of accidents, all companies (and other claims as they may be directed by the chairman).
- (*h*) The review of wages, hours, conditions of service, and similar questions affecting the staffs as a whole to secure uniformity, and the supervision of welfare work.
- (*i*) Communications with the public arising out of the operation of the companies.
- (*j*) The "Safety First" work (all companies).

DEPARTMENT C (RAILWAYS).—In charge of the director of construction (railways).
This department is charged with responsibility for—
- (*a*) The generation and distribution of power, including the control and supervision of the power-house, sub-stations and all equipment used in connection therewith.
- (*b*) The supervision and control of all new works, new construction, and new equipment (including constructional works for the omnibus company in consultation with the chief engineer, L.G.O.C.).
- (*c*) The conduct of engineering research and investigation on behalf of the railways.

DEPARTMENT D (OMNIBUSES).—In charge of a chief engineer (L.G.O.C.).
This department is charged with responsibility for—
- (*a*) The renewal of omnibuses and the construction of new and additional omnibuses.
- (*b*) The overhaul and maintenance of omnibuses in the new central depot and in the coach factories.
- (*c*) The licensing of omnibuses and all questions arising thereout.
- (*d*) The central stores.
- (*e*) Engineering research and investigation work in connection with omnibuses.
- (*f*) Fuel research.

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DEPARTMENT E (RAILWAYS).—In charge of a chief engineer (railways).

This department is charged with responsibility for—

(*a*) The maintenance and renewal of the railways and their equipment.

(*b*) The maintenance and renewal of the rolling stock, lifts, and escalators used upon the railways.

(*c*) The maintenance and renewal of all buildings, whether for railways, tramways, or motor omnibuses.

The chief engineer shall be responsible to the director of construction (railways) for any new works in connection with existing railways.

DEPARTMENT F (TRAMWAYS).—In charge of a general manager (tramways).

This department is charged with responsibility for all questions arising out of the maintenance and operation of the tramways as defined above under departments A, B, and C, except—

(*a*) The determination of fares, rates, and charges.

(*b*) The co-ordination of traffic facilities.

(*c*) The publicity and advertising.

(*d*) The purchase and supply of stores and materials.

(*e*) The Parliamentary work.

(*f*) The settlement of claims arising out of accidents.

(*g*) The maintenance and renewal of buildings.

which shall be dealt with in department A for (*a*) to (*e*) inclusive, in department B for (*f*), and in department E for (*g*), in consultation and agreement with the general manager (tramways).

DEPARTMENT G (COMMON FUND GROUP).—In charge of a secretary and treasurer.

This department is charged with responsibility for—

(*a*) The customary secretarial work of the companies.

(*b*) The financial work.

(*c*) The administration of the estates and surplus property of the companies.

(*d*) The insurance work of all descriptions.

(*e*) The management on behalf of the companies of the superannuation, pension, and other funds instituted by the companies.

DEPARTMENT H (TRAMWAYS GROUP).—In charge of a secretary and treasurer.

This department is charged with responsibility for—

(*a*) The customary secretarial work of the companies.

(*b*) The financial work.

(*c*) The administration of the estates and surplus property of the companies.

(*d*) The insurance work, except national health and unemployment insurance, dealt with by the general manager (tramways).

(*e*) The management on behalf of the companies of the superannuation, pension, and other funds instituted by the companies

THE DIRECTORATE.

The following are the appointments in connection with general direction—

Chairman and Managing Director.—Lord Ashfield.

Finance Committee.—Lord Ashfield (chairman), Mr. E. Garcke, Mr. C. J. Cater Scott, Mr. H. A. Vernet.

Standing Joint Committee.—Lord Ashfield (chairman), Sir W. M. Acworth, Mr. H. E. Blain, C.B.E., Mr. E. Garcke, Lord Farrer, Lord George Hamilton, G.C.S.I., Mr. Frank Pick, Lord Stuart of Wortley, Mr. C. J. Cater Scott, Mr. C. G. Tegetmeier, Mr. H. A. Vernet.

Panel of Directors.—Lord Ashfield (chairman); (*a*) Contracts—Sir H. Babington Smith, G.B.E., C.H., K.C.B., C.S.I., and Mr. Geo. Watson; (*b*) Purchases—Mr. H. W. Brown and Mr. D. Duff; (*c*) Claims—Mr. Ernest Law, C.B., and Mr. C. G. Tegetmeier; (*d*) Receipts and Payments—Col. Sir H. Jekyll, R.E., K.C.M.G., and Mr. W. L. Madgen; (*e*) Staff Welfare—Sir Walter R. Lawrence, Bart., G.C.I.E., G.C.V.O., C.B., and Mr. Murray Griffith; (*f*) Special Duties—Sir James Devonshire, K.B.E.

Assistant Managing Directors.—Mr. H. E. Blain, C.B.E., and Mr. Frank Pick.

Director of Construction.—Mr. Z. E. Knapp.

ALLOCATION OF OFFICERS' DUTIES.

The duties of each officer are set out in considerable detail under the name of each officer appointed. Here we can only give the names of the gentlemen concerned and their offices.

DEPARTMENT A.

Assistant Managing Director in Charge.—Frank Pick.

1 *Comptroller and Accountant.*—Officer in charge, C. S. Louch; Section A, Statistics, A. W. Green; Section B, Accounts, D. B. Colyer; Section C, General Audit, G. Eland; Section D, Traffic Audit, H. N. Trye.

2. *Commercial Manager.*—Officer in charge, Arthur L. Barber; Section A, Fares, S. J. Webb; Section B, Development, C. B. Gilbert; Section C, Investigation, J. E. Cowderoy.

3. *Publicity Officer.*—Officer in charge, Section A, Press, J. H. Richardson, with Mr. B. C. Foxcroft as Assistant; Section B, Traffic Advertising, H. T. Carr.

4. *Legal and Parliamentary Officer.*—C. G. Page.

5. *Purchasing Agent.*—A. Coveney; Deputy Purchasing Agent.

6. *Commercial Advertising Agent.*—H. L. Spratt.

DEPARTMENT B.

Assistant Managing Director in Charge.—H. E. Blain.

1. *Operating Manager (L.G.O.C.).*—Officer in charge, C. J. Shave; Section A, Superintendent of Rolling Stock (L.G.O.C.), A. Rozier; Assistant Superintendent of Rolling Stock (L.G.O.C.), ; Section B, Traffic Superintendent, H. S. F. Lansdown; Road Superintendent, G. P. Barnett; Section C, Ticket Superintendent, S. Smith; Section D, Investigation, J. E. Cowderoy. This section is joint between the operating manager (L.G.O.C.) and the commercial manager.

2. *Operating Manager (Railways).*—Officer in charge, J. P. Thomas; Section A, Superintendent of the Line, J. Thornton; Section B, Chief Passenger Agent, S. J. Webb; Section C, Superintendent of Rolling Stock and Lifts and Escalators.

3. *Superintendent of Schedules.*—J. B. Mackinnon.

4. *Claims Agent.*—S. Newman.

5. *Staff Officer.*—A. T. Spens.

For the purpose of securing co-ordination in the discharge of, but without prejudice to their departmental responsibility for, the respective duties in departments A and B in relation to traffic operation and development, a traffic committee is constituted as follows—The two assistant managing directors, the commercial manager, the publicity officer, the operating manager (L.G.O.C.), the traffic superintendent (L.G.O.C.), and the superintendent of schedules.

When matters concerning the tramways or railways arise the general manager and deputy general manager for tramways and the operating manager (railways) are to be added to the committee.

DEPARTMENT C.

Director of Construction (Railways) in Charge.—Z. E. Knapp.

1. *Superintendent of Power.*—P. V. McMahon.

2. *Technical Officer.*—E. H. Cockshott.

3. *Architectural Officer.*—S. A. Heaps.

DEPARTMENT D.

Chief Engineer (L.G.O.C.) in Charge.—G. J. Shave.

1. *Engineer.*—C. Leese.

2. *Research Engineer.*—

3. *Architect and Surveyor.*—J. E. Ashby.

DEPARTMENT E.

Chief Engineer (Railways) in Charge.—A. R. Cooper.

1. *Mechanical Engineer.*—W. A. Agnew.

2. *Civil Engineer.*—

3. *Signal Engineer.*—W. S. Every.

4. *Assistant Engineer (Indoor).*—C. E. Stanier.

DEPARTMENT F.

General Manager (Tramways) in Charge.—C. J. Spencer.

1. *Deputy General Manager and Engineer,* A. V. Mason. Section A, Traffic, Office of the Traffic Superintendent, Section B, Rolling Stock (mechanical engineer), H. J. Troughton; Section C, Distribution (office of distribution engineer), P. M. Hunt. Section D, Permanent Way (permanent way engineer), E. Bond.

2. *Accountant.*—J. McLeod.

DEPARTMENT G.

Secretary and Treasurer in Charge.—J. C. Mitchell.

1. *Assistant Secretary and Treasurer.*—J. L. B. Lindsay.

2. *Assistant Treasurer.*—H. C. Davy.

3. *Estate Agent.*—F. C. Buller.

DEPARTMENT H.

Secretary and Treasurer (Tramways) in Charge.—E. Boys.

Assistant Secretary and Treasurer.—A. C. Ingram.

Secretary to the Standing Joint Committee.—R. H. Pitts.

Secretary to the Chairman.—C. R. Eddison.

FUEL ECONOMY.

Under the auspices of the Royal Automobile Club, a fuel economy trial is to be held on May 7 in various provincial centres. Cups and medals will be awarded, one-half of the number being reserved for competitors using benzole exclusively throughout the trial. It is the general experience of motorists that a greater mileage is possible on a gallon of benzole than on a similar quantity of petrol.

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Z. E. Knapp
(*Director of Construction*)

H. E. Blain, C.B.E.
(*Assistant Managing Director*)

Frank Pick
(*Assistant Managing Director*)

Lord Ashfield of Southwell, P.C.
(*Chairman and Managing Director, Underground Group of Companies*)

G. J. Shave
(*Chief Engineer and Operating Manager*)

John C. Mitchell, F.C.I.S.
(*Secretary and Treasurer*)

A. R. Cooper
(*Chief Engineer, Railways*)

PRINCIPAL OFFICERS OF THE LONDON UNDERGROUND GROUP.

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EMERGENCY POWERS DURING THE MINERS' STRIKE.

RIGHT TO CONTROL MANY PUBLIC SERVICES.

Wide powers are given to the Government in the Emergency Regulations which were published in the *London Gazette* on April 4 in consequence of the national strike of coal miners. These powers include—

The requisitioning of land, buildings, transport, and food.

Control of shipping, prohibition of exports.

Further, the Board of Trade may take possession of the coal mines and any stocks of coal.

Among the regulations are the following —

ROAD TRANSPORT.

The Minister of Transport may by order—

(*a*) Regulate, restrict, or give directions with respect to the use for the purposes of road transport or the sale or purchase of any horses or vehicles in use or capable of being used for the purpose of road transport.

(*b*) Take possession of any such horses or vehicles or require them to be placed at the disposal of the Minister, or of any person specified by the Minister in that behalf, either absolutely or by way of hire, and either for immediate or future use.

(*c*) Require persons owning, or having in their possession or under their control, any such horses or vehicles, to make to the Minister, or to any person specified by the Minister in that behalf, returns giving the prescribed particulars with respect to those horses and vehicles, and require any such returns to be verified in the prescribed manner.

(*d*) Require persons owning, or having in their possession or under their control, any such horse or vehicle, to give notice in the prescribed manner before disposing thereof, or allowing it to pass out of their possession or control.

(*e*) Prohibit the carriage of goods of any class by road, and prescribe the radius or distance within which goods may be carried by road.

(*f*) Provide for the giving of directions with respect to the carriage of goods on any particular vehicles, or by any particular route, or to any particular clearing house or depot.

(*g*) Regulate the priority in which goods are to be carried by road and vehicles used for the purposes of road transport.

(*h*) Prescribe the conditions on which, and the rates at which, horses or vehicles may be hired for the purpose of road transport and goods carried by road, and the conditions on which goods so carried or to be carried are to be loaded or discharged.

(*i*) Make such other provisions in relation to road transport as appear to the Minister necessary or expedient.

Any order under this regulation may be made so as to apply either generally to all horses and vehicles, or to horses or vehicles of any class, or to horses or vehicles belonging to any particular owner.

For the purpose of testing the accuracy of any return made to the Minister under this regulation, or of obtaining information in the case of failure to make a return, or to give any prescribed notice, any person authorised by the Minister may enter any premises belonging to or in the occupation of the person who has made or has failed to make the return, or on which the person so authorised has reason to believe that any horses or vehicles with respect to which a return has been required under this regulation are kept, and may carry out such inspection and examination (including the inspection and examination of books) as he may consider necessary for testing the accuracy of the return, or for obtaining such information.

Penalties are provided for contravention of these regulations.

TRAMWAYS AND LIGHT RAILWAYS.

The Minister of Transport for the purpose of making the most efficient use of the materials or plant belonging to a tramway or light railway underaking may, by order, require the whole or any part of the rolling stock, materials, and plant, including permanent way, of any such undertaking to be placed at his disposal or at the disposal of any person or body of persons named by him.

Where any such order has been made, the Minister or any such person or body of persons may take possession of such portions of the rolling stock, materials, or plant of such undertaking as they may require, and may remove them, and make use of them for the purposes of any other tramway or light railway.

TRAFFIC ON HIGHWAYS.

Where, with a view to preventing congestion of traffic on, or excessive damage to public highways, the Minister of Transport considers it is expedient to do so, he may provide for the regulation of transport on public highways, and may provide for directions being given for prescribing the routes to be followed, and restricting the types of vehicles to be used.

The Minister of Transport, or any preson appointed by him for the purpose, may grant to any person a licence to drive a motor car during the period for which the proclamation of emergency is in force, and may suspend during that period any licence granted under the Motor Car Act, 1903.

PRIORITY IN TRANSPORT.

Without prejudice to any other powers possessed by him, the Minister of Transport may by order regulate the priority in which passengers or goods are to be carried by railway, light railway, tramway, or canal. The clearance of any ship, whether to ports beyond the seas or coastwise, may be refused except under such conditions as the Commissioners of Customs and Excise may allow, and any clearance granted may be withdrawn.

GAS, WATER, AND ELECTRICITY.

The Board of Trade or the Minister of Transport may require the owners of any undertakings for the supply of gas, water, or electricity to comply with any directions as to the supply thereof.

MOTOR SPIRIT.

The Board of Trade may prohibit or regulate the sale, supply, delivery, or use of motor spirit, and require any persons owning or having the power to dispose of motor spirit to place the same at the disposal of the Board or of any person authorised by them.

EFFECT ON CONTRACTS.

Among other regulations are clauses giving the Board of Trade power to take possession of coal mines and to fix the prices of coal.

The final clause says—If the fulfilment of any contract is interfered with by the necessity of complying with these regulations, that necessity shall be a good defence to any proceedings taken in respect of the non-fulfilment of the contract so far as it is due to that interference.

TRANSPORT OF FOOD.—ORDER BY THE MINISTRY.

On April 5 the Secretary to the Ministry of Food issued the following Order—

The Road Transport Requisition Order, dated March 31, 1921, made by the Food Controller under the Ministry of Food (Continuous) Act, 1920. In exercise of powers conferred upon him the Food Controller hereby orders as follows—

(1) Where a proclamation of emergency has been made under the Emergency Powers Act, 1920, and so long as the proclamation is in force, the following provisions shall have effect.

(2) Every person owning or having in his possession or under his control any horse or vehicle to which this Order applies is required, when directed so to do by any of the persons hereinafter specified, to place the same at the disposal absolutely or by way of hire as required of that person, who is hereby authorised to take possession of and use the same. The specified persons are (i.) any divisional officer or other person mentioned in the schedule hereto; (ii.) any person authorised in writing by any of the persons mentioned in the schedule hereto to take possession of horses or vehicles to which this Order applies.

The arbitrator to determine, in default of agreement, the compensation to be paid for any horse or vehicle requisitioned under this clause, shall be appointed by the Lord Chief Justice of England in England and Wales, or by the Lord President of the Court of Session in Scotland.

(3) This Order shall apply to all horses and road vehicles (whether horse-drawn or mechanically propelled or drawn) in use or capable of being used for the transport of goods by road, except

(*a*) Any horse or vehicle used for any of the following purposes, namely—naval, military, or air force purposes, postal, police, fire brigade, or ambulance purposes, or medical and veterinary purposes.

(*b*) Any vehicle licensed for the purposes of plying for public hire (other than chars-a-bancs which are also registered with any county, municipal, or other local authority as goods carrying vehicles).

(*c*) Any horse or vehicle used wholly or mainly for the purpose of agriculture.

(4) Failure to comply with any direction given in pursuance of this Order is a summary offence under the Ministry of Food (Continuance) Act, 1920.

(5) The Road Transport (Requisition) Order, 1919, is hereby revoked.

The persons specified under the Order are as follows—

Major-General Sir R. A. Kerr Montgomery, Newcastle-on-Tyne; Mr. W. Carby-Hall, Leeds; Mr. E. J. Andrew, Preston; Mr. W. O. Macarthur, Nottingham; Mr. T. Pritchett, Birmingham; Brigadier-General H. A. Jones, London; Mr. Arman, Reading; Mr. J. A. Crawford, Bristol; Mr. J. R. Hughes, Carnarvon; Mr. A. Ivor Parry, Cardiff; Sir John Lorne Macleod, Grosvenor Street, Edinburgh; Mr. J. Erskine Dods, Edinburgh; Mr. J. L. Wells, Glasgow; Mr. M. Hellier, Edinburgh; Lt.-Col. C. F. Bell, Palace Chambers, London, S.W.1.

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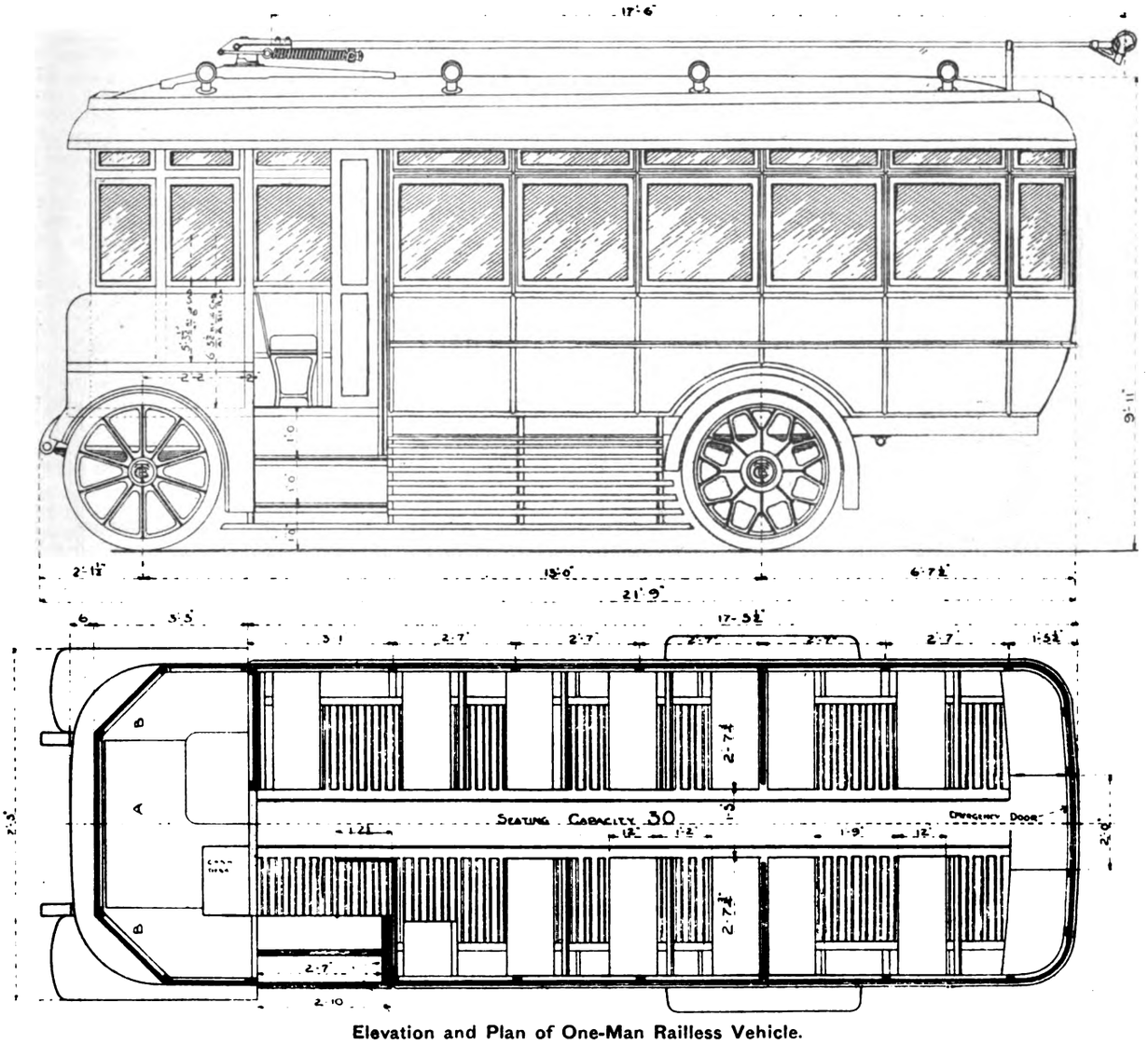
RAILLESS DEVELOPMENTS AT BRADFORD.

"ONE-MAN" RAILLESS VEHICLE.

As mentioned in our issue of March 17, the Minister of Transport has given authority to Bradford Corporation to operate their existing railless routes with "one-man" single-deck cars. The design is shown in the accompanying drawing, for which we are indebted to Mr. R. H. Wilkinson, general manager of Bradford Corporation Tramways. The vehicles will be driven by one tramcar motor of general design, the chassis being similar to that of the experimental double-deck top-covered railless vehicle in use in Bradford, which was described in our issue of December last, except that it is of lighter construction on account of the chassis carrying only a single-deck body. The vehicle seats 30 passengers.



Elevation and Plan of One-Man Railless Vehicle.

The running expenses will, it is estimated, be between 4d. and 6d. per mile less than those of the present vehicles and between 7d. and 9d. less than the running expenses of a tramcar. Traffic on the routes on which these vehicles are at present running is very light, and heavy losses have had to be faced each year. It has, therefore, become essential to cut down the expenses in order to be able to maintain the service, and in the single-deck one-man car Mr. Wilkinson has designed a vehicle which should attain the desired end.

SIX-WHEELED RAILLESS VEHICLES.

The six-wheeled railless vehicles, of which an illustration is given on the following page, have been designed by Mr. Wilkinson with a view to distributing the weight over a larger surface. One half is carried on the rear axle, the other half being divided equally between the two front axles, making one-quarter of the weight on each rear wheel and one-eighth of the weight on each front wheel. Both pairs of front wheels turn for steering purposes. The addition of the extra pair of front wheels and the consequent redistribution of the weight make it possible to allow a space between the front wheels and the front of the vehicle, which is very suitable for the accommodation of a lifeguard. Smoother running is achieved by the increase in the number of wheel contacts with the road surface.

Other particulars are—

Height to roof...	14 ft. 7 in.
Height of the saloon floor from the road ...	2 ft. 8 in.
Height inside lower saloon	5 ft. 10 in.
Height inside top saloon	5 ft. 6 in.
Width of body	6 ft. 10 in.
Length overall	23 ft. 10 in.

The cars are equipped with electric motors capable of developing 60 H.P. The transmission to rear axle is by means of gear wheel and chain reduction, with differential on the back axle.

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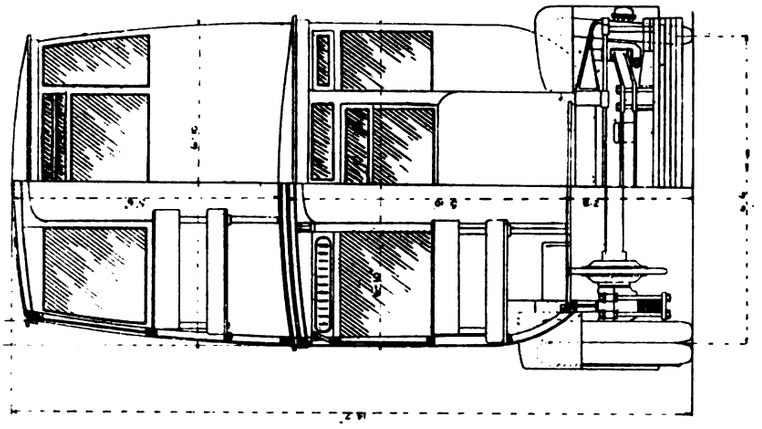
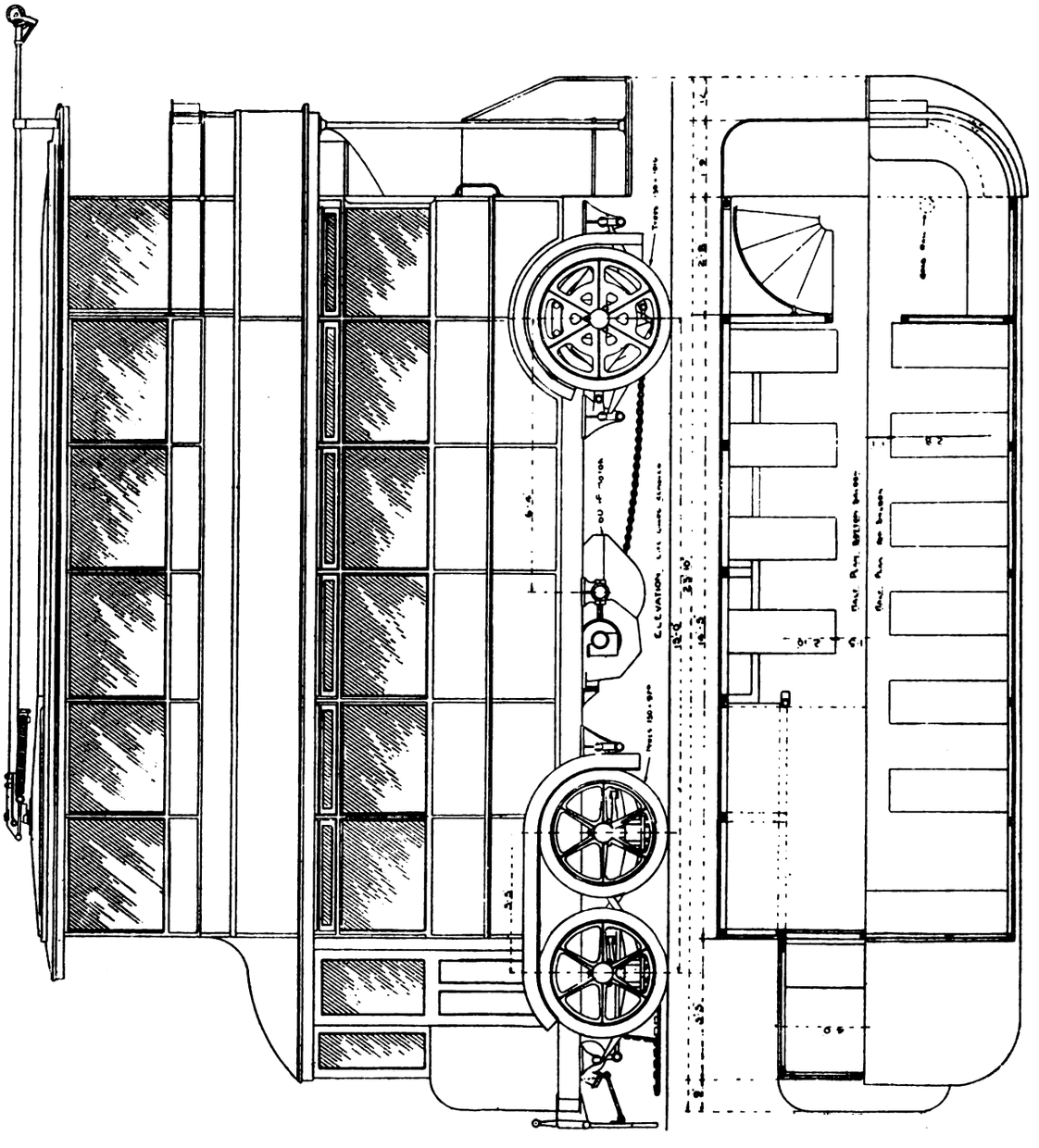


Half End Elevation and Section.

Weight on front Axles = Half total load.
Weight on rear Axle = Half total load.
The Car seats 33 passengers in the top saloon and 24 passengers in the lower saloon.



Elevation and Plan of Six-Wheeled Railless Vehicle, with Two Front Axles and Steerable Wheels, Designed for Use at Bradford.

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FINANCIAL REPORTS AND MEETINGS.

THE ENGLISH ELECTRIC COMPANY, LTD.—The directors have recommended a dividend of 8 per cent. (less tax) on the ordinary shares.

METROPOLITAN-VICKERS ELECTRICAL COMPANY, LIMITED.—The directors have decided to recommend the payment of a dividend on the ordinary shares at the rate of 12½ per cent. for the year ended December 31, 1920.

MANSFIELD AND DISTRICT TRAMWAYS, LIMITED, have announced the issue of £40,000 eight per cent. seven-year secured debentures in 800 registered debentures of £50 each at 96 per cent. The debentures will be redeemable in each case at 103 per cent. on December 31, 1927.

BRITISH ALUMINIUM COMPANY, LIMITED.—Including the amount brought forward, and after making provision for taxation and debenture interest, the accounts show a profit of £237,612. Of this amount £50,000 has been set aside for depreciation, making this fund £550,000, and £50,000 has been placed to reserve, bringing it up to £170,000. A final dividend was proposed at the rate of 12 per cent. on the ordinary shares, making 10 per cent. for the year, carrying forward £19,534.

LEICESTER TRAMWAYS FINANCES.—The accounts for the past year of the Leicester Corporation tramways undertaking show that the receipts in excess of working expenses and cost of repairs and maintenance amounted to £41,687. Interest and sinking fund charges and income tax were £45,771, leaving a deficit on the year of about £2,084. The total revenue of the undertaking for the 12 months was £346,580. On the electricity undertaking there was a surplus shown of £475.

ABERDARE URBAN DISTRICT TRAMWAYS.—The accounts for the year ended March 31, 1920—which comprise the accounts of the tramways and omnibuses—show a total revenue of £30,162, as compared with £26,820 for 1918-19. Working expenses amounted to £25,485, as against £18,003, leaving a gross profit of £4,677, to which the tramways contributed £4,922, while the omnibuses incurred a loss of £245. The net result was a profit of £149. The net profit of the previous year was £2,598.

THOMAS TILLING, LIMITED.—Mr. R. S. Tilling (Chairman), presided at the annual meeting. The net profits for the year, after providing for interest on the first debentures, were approximately £110,000, and after declaring a dividend of 10 per cent. on the ordinary shares, there was a balance of £59,263. The Chairman said the times through which they had been passing had been exceedingly difficult, but since the alteration in fares, the London omnibus traffic has again become remunerative.

NEWCASTLE TRAMWAYS ESTIMATES.—A report of the Newcastle Corporation Tramways Committee states that the estimated income for the ensuing year is £598,650, including £13,000 from public lighting and electricity supply, and the net surplus over estimated expenditure is given as £12,235. The committee remarks that any increase in the wages bill must be followed by a further increase in fares. The present reserve fund of the undertaking is approximately £177,000, out of which £62,000 will be paid during the current year.

STEWARTS AND LLOYDS.—The directors recommended, after setting aside £70,000 for depreciation and making provision for taxation, a dividend on the deferred (fully paid) shares of 2s., and a bonus of 1s. per share for the year; on the deferred shares (10s. paid) 6d., and a bonus of 3d., and on the deferred shares issued in exchange for shares in Alfred Hickman 1s., and a bonus of 6d. per share, all free of tax. The reserve is increased by £150,000, £10,000 is allocated to employees' benefit reserve, and £110,000 is carried forward.

TORQUAY TRAMWAYS COMPANY, LIMITED.—The profit for 1920 was £24,969, to which is added profit on operating motor omnibuses, etc., £4,878, making £29,847. After deducting debenture interest and amount transferred to sinking fund, etc., the balance is £23,247, to which is added £5,786 brought forward. The sum of £8,000 is placed to reserve and renewals account, etc.; £1,000 to reserve for equalisation of dividends. A dividend of 8 per cent. for the year, free of tax, is proposed, and £10,302 is carried forward, subject to excess profits duty (1919 and 1920) and income tax.

CAMMELL LAIRD AND COMPANY, LIMITED.—The report for 1920 shows profit of £260,632, as compared with £303,006 for the previous year. Including £91,636 brought forward, the total for disposal is £352,269. The directors recommend a dividend of 1s. per share, or 5 per cent. on 2,123,455 ordinary shares, less tax, making 7½ per cent. for the year, and 6·875d. per share on 669,736 new ordinary shares, less tax, making a dividend at the rate of 7½ per cent. per annum, calculated from instalment dates, writing off discount and expenses of five-year note issue, £31,500, and carrying forward £71,471.

HADFIELDS, LIMITED.—The profit of Hadfields, Limited, for 1920 was £107,856, plus £133,610 brought in, making £241,466. A further dividend was recommended on ordinary shares of 6d. per share, making 5 per cent. free of tax, carrying forward £135,727. The moulders' strike and other stoppages seriously affected operations, and the directors have long had under consideration the possibility of developing the use of the Hadfield system of manufacture and sale of their products in the United States. With this object in view, they have joined with American Clay Machinery Company, who were already licensees of the company, in forming the Hadfield-Penfield Steel Company, in which Hadfields, Limited, now hold a substantial interest. Reconstruction of war extensions to adapt them to post-war trade and the installation and equipment of new steel foundry and rolling mills have involved very large capital outlay, and the directors decided to make a debenture issue of £1,000,000 of 7½ per cent. debenture stock, redeemable in ten years, which has been successfully carried out.

GLASGOW SUBWAY COMPANY'S DIFFICULT YEAR.—The annual meeting of the Glasgow Subway Railway Company was held on March 17. Mr. William Whitelaw (the chairman), in moving the adoption of the report, said the company has passed through a year of exceptional difficulties. Mainly on account of a strike of a majority of their employees at the beginning of the year, but also in consequence of the great rise in the cost of all materials, their revenue had come short of their expenditure by £15,327. They had carried about 3,772,000 fewer passengers, and traffic receipts were over £5,000 less than in the previous year. They had made several experimental changes in fares, and they were of opinion that they had now fixed the fares upon as remunerative a basis as possible, in view of the great competition of the Corporation tramways. The institution of weekly tickets, 3s. each, available between all stations, had proved a marked success. As the directors could not confidently estimate that the railway could be run profitably during the current year, they asked the shareholders' consent to a temporary closing of the line, if necessary. To this the meeting agreed. Several suggestions were put forward to promote more profitable working, but the Chairman pointed out that the company had not the necessary money to embark on new constructional plans.

DERWENT VALLEY LIGHT RAILWAY.—The annual meeting of the Derwent Valley Light Railway Company was held at York. Lord Deramore, who presided, moved the adoption of the report and balance sheet, and said it was not altogether unsatisfactory in view of the difficulties experienced during 1920. Referring to the increasing road competition facing railway companies, he said they were fully alive to this and could only hope that their friends in the district served by the Light Railway would not be unduly influenced by the merchants and saddle themselves with long-distance cartage to their own detriment and for the benefit of others. The fact should not be overlooked that whereas roads were maintained at the public expense, railway companies had to provide and maintain a costly track, and the more the roads were cut up the greater was the demand upon the ratepayers' pockets. After referring to the trade depression, Lord Deramore said that as agriculture—which formed the greater part of the railway's tonnage—was seriously affected, their revenue was not quite of the volume anticipated. Figures were quoted to show that the finances of the company were steadily improving, and the Chairman said he believed that theirs was the only light railway in the country, worked by steam locomotives, in which coaches were lighted by electricity.

BRITISH INSULATED AND HELSBY CABLES, LIMITED.—The 25th annual meeting was held at Liverpool. Mr. James Taylor (the chairman) presided, and in moving the adoption of the report and balance sheet said the profit for the year amounted to £340,713, an increase of £12,024 over the previous year. With the exception of two stoppages at the Prescot works, the factories, both at Prescot and Helsby, had been busy throughout the year, and the present state of the order book was quite satisfactory. Present high costs of manufacture and inability to give certain delivery, owing to labour unrest, were preventing the company from taking orders, which were now being placed abroad. Foreign trade could only be retained by a reduction in the cost of production, and although a decrease in the present high rate of wages would have a most beneficial effect, another and very important element had to be considered, viz., increased efficiency in the mechanical means of production. The company, therefore, had carried out a reorganisation of the works. They had built what were practically three new factories, fitted with all the latest and most improved appliances, and had enlarged the power plant. They had also greatly improved and increased the facilities for handling raw material and finished products, besides making improvements in other departments which should largely tend to cheapen production. The payment of 6¼ per cent. dividend at once, and 5 per cent. bonus on June 30, making a total distribution for the year of 15 per cent., was authorised. The sum of £105,000 was carried to reserve and depreciation and £116,000 was carried forward.

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LAST YEAR'S STREET ACCIDENTS.

How Tramways and Omnibuses Figured in Returns.

In the Home Office White Paper (No. 53) which enumerates all accidents known by the police to have been caused by vehicles last year "in streets, roads, or public places," and resulting in death or personal injury, some interesting figures are given as to the proportion of such accidents in which, among other vehicles, tramcars and omnibuses were involved.

In the whole of the United Kingdom there was an increase in the total number of accidents in 1920 of 6,421 compared with 1919, the respective figures being 57,747 and 51,326. In England and Wales alone the increase was 6,159, the total for 1920 being 51,703. In Scotland the total for last year was 4,735—an increase of 529, but Ireland showed a decrease of 267, the 1920 aggregate being 1,309.

In the Metropolitan Police District (a circle with a circumference fifteen miles from Charing Cross and excluding the City of London) the total number of accidents was 20,903, of which 638 were fatal. In the City of London the total was 757, resulting in the deaths of nineteen persons.

Appended is a list of some of the principal cities and towns, showing the total number of accidents in each and specifying in how many were tramcars or omnibuses concerned—

Police District.	Accidents.			Involving	
	Fatal.	Non-fatal.	Total.	Tramcars.	Omnibuses.
Metropolitan Police District	638	20,265	20,903	2,510	1,663
Liverpool	50	2,095	2,145	689	18
Manchester ...	70	1,147	1,217	276	1
Birmingham ...	65	1,144	1,209	126	25
Glasgow	55	1,093	1,148	380	
Edinburgh* ...	18	1,008	1,026	305	
Newcastle-on-Tyne	8	722	730	168	1
Sheffield	54	673	727	145	6
Portsmouth ...	3	660	663	81	4
Leeds	24	558	582	124	
Dublin Metropolitan Police Dist.	26	493	519	75	
Bradford	16	331	347	63	1
Cardiff	11	288	299	27	1
Swansea	19	272	291	24	6

* Edinburgh figures include those for the former police district of Leith for the period to November 1, 1920.

The following is a summary of the various classes of fatal accidents in the United Kingdom, giving comparative totals with the year 1919.

Fatal Accidents.

Police District.	Horse-drawn Vehicles.	Omnibuses.	Tramcars.	Other Vehicles.	Pedal Cycles.	Total.
England and Wales ...	284	166	150	1,646	140	2,386
Scotland	59	17	35	181	26	318
Ireland	27	6	11	81	8	133
Total, United Kingdom	370	189	196	1,908	174	2,837
Total, United Kingdom, 1919	440	211	187	1,612	178	2,628

The analysis of all accidents in the Metropolitan Police District is as follows—

	Fatal.	Non-fatal.
Horse-drawn vehicles	69	2,531
Omnibuses	80	1,583
Tramcars	38	2,472
Other vehicles	433	9,853
Pedal cycles	18	3,826

MUNICIPAL TRAMWAYS ASSOCIATION'S OFFICES.

Mr. J. Beckett, general secretary of the Municipal Tramways Association, has removed the headquarters of the Association from Gothic Lodge, Accrington, to 5 and 6, Clements Inn, Strand, W.C. The new offices are conveniently situated, adjoining the Law Courts and near the Temple Station, and will form a much needed centre for the work of the Association which is constantly growing in extent and importance.

Institute of Transport.—The second annual dinner will be held in the Grand Hall, Hotel Cecil, on Tuesday, April 26, at 7 p.m. Lord Ashfield of Southwell will preside.

TRAMWAY AND LIGHT RAILWAY NOTES.

BRADFORD.

Report on Inquiry into Accident.

The report of the Inspector of the Ministry of Transport into the accident on February 3, when a tramway car, travelling late at night towards Thackley, overturned at the Idle points, Five Lane Ends, has been received. It will be remembered that 37 persons were injured. A local inquiry was conducted by the Ministry of Transport's Inspector (Major G. L. Hall), and the report embodies his findings. He asserts the evidence indicated that the driver of the tramcar lost his bearings owing to the fog which prevailed at the time. He failed to realise that he was so near the points, and he struck them when travelling at a rate estimated at 15 miles an hour. Under all the circumstances, the inspector says, he is unable to absolve the driver from responsibility, but he recognises the difficulty the driver must have had in estimating the speed at which he was travelling or the point in his journey that he had reached. In conclusion, the inspector recommends that a special light signal should be arranged at junctions like that at Five Lane Ends. It may be noted that a system of light signals had, in the meantime, been arranged for by the City Tramways Committee.

BRIGHTON.

Reversion to Penny Fares.

Following the report by the Tramways Committee of the Brighton Town Council that they were unable to make any recommendation as to a reversion to penny fares, the Council decided to adopt such fares for three months as an experiment. The minimum of twopence established some time ago failed to solve the financial difficulties experienced since the war.

DUNDEE.

Omnibuses to Supplement Tramways?

A sub-committee of Dundee Town Council on March 27 discussed the question of tramway fares, and decided to recommend that the present ones be continued. The chairman, Mr. A. Malcolm, said the revenue had decreased during the last two or three weeks on account of trade depression, and it was estimated that by May 15 there would be a debit balance of £7,870. The treasurer (Mr. Johnston) asked whether it was worth while relaying tracks, as the possibilty of using motor omnibuses would arise in time. He favoured their use on certain routes. It was decided to instruct the general manager (Mr. W. T. Young) to report on the desirability of substituting motor omnibuses. A scheme to carry the estimated deficiency of £7,870 to reserve, on the debit side, was approved.

GLASGOW.

No Railless Cars Without Permission.

With reference to the proposal before the Glasgow Corporation to utilise railless trolley cars for tramway extensions, the Town Clerk has submitted to the Tramways Committee a report by the Parliamentary Agents regarding the powers of municipal corporations to run trolley vehicles. The agents stated that the Corporation had no power to run such vehicles without specific Parliamentary authority, and that if Parliamentary sanction to do so were obtained, it would be coupled with an obligation to contribute towards the expense of maintaining the roads outside the city on which the vehicles would run.

HALIFAX.

Tramway Extension to Stainland.

A noteworthy step in the extension of the Halifax Corporation tramways from West Vale to Holywell Green, Stainland, was marked on March 31, when the first section, which is just over a mile in length, was opened. It is hoped that the whole extension will be completed within a few months. The formal opening was performed by the Mayor of Halifax, and was attended by members and officials of the Corporation and Tramways Department and of Stainland District Council.

HULL.

Decorated Tramcars.

Two cars of Hull Corporation Tramways, in addition to their normal utility, have acquired a new role, and are now objects of art in the streets of the city. They have been elaborately decorated by the master and students of the School of Art, in connection with the Marvell Tercentenary, and appeared for the first time on March 31. The decorations have been worked round the body of the cars. On the front are the arms of Marvell, while panels along the sides bear his shield and that of the city. A symbolical picture of the development of Hull shipping since the year 1300 is contained in a centre panel. A frieze with a background of blue has been worked round the upper part of the car, bearing a series of portraits, including those of Marvell, Charles I., Charles II., Prince Rupert, and Cromwell. The scheme was first contemplated by the chairman of the

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Tramways Committee, Councillor A. Digby Willoughby, who presided at the unveiling ceremony. He was accompanied by Mr. J. J. Brownswood (Headmaster of the Art School), and others present included the Lord Mayor and Lady Mayoress (Alderman and Mrs. T. Beecroft Atkinson), the Sheriff and Mrs. Locking, Mr. H. Earle, and Archdeacon Lambert. In his opening remarks, Councillor Willoughby paid a tribute to the master, staff, and students of the Art School, and to members of the tramways department who had given voluntary service to the work. He emphasised the artistic value of the cars as an asset to the city, and mentioned that it was proposed to treat the tramway standards in a similar decorative manner. The Lady Mayoress unveiled the cars.

LIVERPOOL.

CAUSE OF OVERHEAD RAILWAY ACCIDENT.

Major A. Mount, of the Ministry of Transport, has presented a report on his inquiry into the collision between two electric trains which occurred at James Street Station, Liverpool Overhead Railway, on January 25. The accident was caused by the 6.54 a.m down train from Dingle running into the rear of a train standing at the platform. Passengers, driver, and guard of the former train received minor injuries and shock. Major Mount states that the collision was "a simple but serious case of misunderstanding and slack working under normal conditions." He is satisfied that the signals and block instruments were in working order, and holds that a ticket collector, who hand-signalled the second train "clear" through Custom House Station, and the driver of that train, were "seriously to blame." Finally, Major Mount asserts—"The accident is clearly one which would not have happened had the new system of signalling now in course of introduction on this line been in operation. The work is in hand, but there is delay in the supply of certain material. When the system is brought into use the block instruments will be abolished." He recommends the abolition of hand-signalling of all non-stop trains through stations, adding that such signals ought only to be used in exceptional circumstances.

LONDON.

TRAFFIC BILL ABANDONED — IMPROVEMENT OF EMBANKMENT TRAFFIC—MOTOR CARS AID STAFF ORGANISATION—POLICE AND A TRAFFIC PROBLEM.

Viscount Curzon asked in the House of Commons on March 21 what had been done to give effect to the report of the Select Committee on London Traffic. Lieut.-Colonel Sir F. Hall asked whether the Government intended to introduce a Bill to carry out the recommendations contained in the report on London Traffic; if so, when would the necessary legislation be proceeded with; and if it was not intended to adopt the Committee's recommendations, what was the policy of the Government for dealing with this urgent problem? Sir E. Geddes (Minister of Transport)—The conclusions of the Select Committee were, as the hon. member is aware, further considered by an Advisory Committee under the chairmanship of the Hon. Member for Hornsey (Mr. Kennedy Jones), and a Bill for the establishment of a London traffic authority has been under consideration, but in view of the general need for economy, both of public and local funds and of Parliamentary time, it has been decided that it is not desirable to proceed with this Bill at present. Moreover, the proposal is highly contentious. I shall be glad, however, to consider any practicable alternative proposals put forward by the authorities concerned.

At the meeting of the London County Council, on March 22, the Highways Committee reported that they had considered the movement of tramway traffic along the Embankment with a view to avoiding the delays which sometimes occur at heavy loading points such as Charing Cross, Waterloo Bridge, and Blackfriars Bridge. A number of re-arrangements were proposed which it is expected will result in a saving of time owing to the reduction in the number of cars turning on the Embankment. The change will also result in reducing the number of cars required, and these will be utilised to improve the existing services. The maximum number of cars in one hour between Westminster and Blackfriars Bridges would, it was reported, be increased from 97 to 130, excluding trailers. The full benefit could not be secured, however, from the institution of the various new circular routes arranged unless fares were equalised in either direction, and it was recommended that except as regards 1d. and 1½d. fares, the present fare stages to and from Westminster and Blackfriars Bridges be extended along the Embankment to Blackfriars and Westminster Bridges respectively. The proposals were adopted.

The efficacy of the motor car in departmental organisation, as a means of effecting economy in the numbers of *personnel*, is instanced by a report of the Highways Committee of the London County Council. It appears that in connection with the reorganisation of the tramways department the Council on December 18, 1917, authorised the appointment of two sub-station inspectors, each at a salary of £200, rising by annual increments of £12 10s. to £250 a year, on the pre-war scale. The Highways Committee reported that the present organisation of the distribution section of the electrical branch of the tramways department is working satisfactorily, and as additional motor cars are now available for the use of the staff, they consider that it will be unnecessary to fill the positions. The fixed staff of the tramways department under the direction of the Highways Committee was consequently reduced by two sub-station repair inspectors in the electrical branch.

The constantly recurring question of whether a vehicle should be allowed to pass a stationary tramway car on its near side, in view of the danger to passengers alighting from or boarding the car, has been taken up by the Shoreditch Borough Council, who have sought the support of other London civic bodies in appealing to the Metropolitan Police Commissioner to have preventive measures taken. The Bethnal Green Borough Council reports that the matter is one upon which the Council and other Borough Councils have made representations on the lines now suggested by the Shoreditch authority, and on the last occasion the Council was informed by the Commissioner of Police that the police can only act when a breach of the law is observed, and that passing a tramcar on the near side does not constitute a breach of the law. The Council has referred the matter to the Metropolitan Boroughs Standing Joint Committee.

WOLVERHAMPTON.

PROPOSED FARE INCREASE.

Wolverhampton Corporation Tramways Committee have decided to recommend an increase in fares on the basis of 1½d. per mile, with a minimum fare of 2d. The present minimum ordinary fare is 1½d., but the Committee state that the costs of the undertaking for the year, April, 1921, to March 1922, are estimated at 28·3d. per car-mile, while the revenue at present amounts to only 22d., representing an approximate deficiency of £35,000.

YORK.

INCREASED WORKMEN'S FARES.

The increase of workmen's fares on the York Corporation Tramways to 2d. (return) for the ordinary 2d. (single) journeys has been authorised by the Ministry of Transport

SOUTH YORKSHIRE.

NEW LINE PROPOSED.

A joint scheme of the Urban District Councils of Wombwell, Wath-on-Dearne, Bolton-on-Dearne, and Thurnscoe to lay 16 miles of tramway between Barnsley and Mexborough is to be the subject of an inquiry by the Ministry of Transport. The powers sought are really confirmation and extensions of the original Dearne District Light Railway Order, 1915, the operation of which was deferred by the war. The proposals involve estimated expenditure of £300,000.

THROUGH RUNNING ON TRAMWAYS.

The Ministry of Transport has sent to the Municipal Tramways Association, and to the Tramways and Light Railways Association the following letter, signed by Mr. N. F. Dunnell, on through-running on tramways—

"Applications are being received by the Minister of Transport to exercise his powers, under Section 5 of the Ministry of Transport Act, to order through-running on adjoining tramways, and, in default of agreement, to settle the terms of such through-running.

"The Minister is aware that existing through-running agreements between tramway undertakings vary in many particulars, and he realises that, owing to the widely-differing conditions of individual cases, it is impossible to stereotype such agreements. He nevertheless considers it desirable, so far as local conditions may permit, to base such agreements on certain standard principles.

"In this connection I am to inquire whether your Association has recently either prepared a standard form for such agreements, or drawn up any statement of general principles upon which such agreements should be based. If so, the Minister would be grateful for a copy thereof. The Minister would also be glad to be furnished with any observations which your Association may think it desirable to make on the subject."

LANCASHIRE AND YORKSHIRE ELECTRIFICATION SCHEME.

It was reported at a meeting of the Burscough Urban District Council that Mr. Ashton Davies, passenger superintendent of the Lancashire and Yorkshire Railway, had stated that it was the intention of the company to electrify the whole of the lines between Ormskirk and Southport. When this has been done the Lancashire and Yorkshire Railway will have a circular electric line from Liverpool to Southport along the coast, returning *via* Ormskirk and Aintree.

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PERSONAL.

Mr. W. A. Toppin, assistant electrical engineer of Chesterfield Corporation has been granted an increase in salary to £547 per annum.

Mr. J. Arthur Smith has been appointed a director of the British Insulated and Helsby Cables, Limited, in place of Dr. E. K. Muspratt, resigned.

Mr. W. J. Squires has been re-appointed chairman of the Highways Committee of the London County Council, and Lieut.-Col. A. C. H. Kennard, vice-chairman.

Mr. A. A. Campbell Swinton, F.R.S., M. Inst.C.E., M.I.E.E., has been appointed chairman and managing director of the Scarborough Electric Supply Company, Limited.

Mr. Walter Rutherford, whose resignation as joint managing director of the English Electric Company, Limited, was recently announced, has been appointed a director of the Calcutta Tramways Company, Limited.

Mr. Alfred S. Bartram, secretary of the Hull Corporation tramwaymen's organisation has been presented with a gold watch and chain by his comrades, in recognition of his services. Mr. E. S. Rayner, manager of the Corporation Tramways, made the presentation. Mrs. Bartram received a gold cameo brooch.

Mr. Ben Hall, general manager and engineer of Wigan Corporation tramways, has been appointed general manager of Halifax Corporation tramways. Mr. Hall, who is 36 years of age, was appointed manager of Wigan tramways in 1919, and he was selected for the position at Halifax from twenty-six applicants.

We deeply regret to record the death of **Mr. T. E. Gatehouse,** which took place on March 31 at his residence at Tulse Hill. After being associated with much early work in the construction of submarine telegraph cables and in the electric lighting industry, in 1882 he became editor of the *Electrical Review*, of which Mr. H. Alabaster was proprietor. In the following year the firm of H. Alabaster, Gatehouse and Company was formed, and for nearly forty years Mr. Gatehouse continued to share in the conduct of the *Electrical Review*. In recent years, however, owing to failing health, he had taken little part in active work, but as editorial and technical director he continued to serve it in an advisory capacity. He was a musician of unusual excellence, and his services as violinist were in constant request. He was one of the founders of the Electro-Harmonic Society, and continued to be its musical director until the last. He was a member of the managing committee of the Electrical Trades Benevolent Institution, an A.M.Inst.C.E., M.I.E.E., and F.R.S.E.

CONTRACTS AND ORDERS.

Plymouth Corporation have accepted the tender of the Local Motor Car Company for the supply of a motor sweeper at a cost of £750.

The Birmingham Private Telephone Company are carrying out the installation of the local telephone system at the tramways depot of Wolverhampton Corporation.

Plymouth Tramways Committee have approved the tender of Heath and Company, for a Universal heavy milling machine complete with all accessories, at £550.

Wolverhampton Tramways Committee have accepted the tender of Messrs. Smith and Bellhouse, Wolverhampton, for the electrical wiring of the new garage and offices.

Track Insulators.—The London County Council, through the Highways Committee, have accepted the tender of Buller's Limited, Laurence Pountney Hill, E.C., for the supply of 10,000 track insulators, at £637 10s. per thousand.

Hired Steam Wagons.—Manchester Corporation have accepted the tender of Messrs. Edmondson and Whyatt for the hire of such steam wagons and trailers as may be required during the next six months by the Streets Committee.

Southend Light Railways Committee has considered quotations obtained by the electrical engineer for the supply of 24 controllers required in connection with the overhauling and re-equipment of 12 cars (the motor and brake gears for which have already been purchased), and it was resolved to recommend that the tender of the English Electric Company, Limited, for the supply of 24 controllers at £60 each be accepted.

Thermit, Limited, a constituent company of Nobel Industries, Limited, have transferred their extensive works at 675, Commercial Road, E.14, to 155, Church Road, Battersea, S.W.11. The new location is more convenient to customers of the company, and also to the company itself, since much time is saved owing to the fact that the head office and works of Thermit, Limited, are now on the same site.

BUSINESS NOTICES.

C. A. Vandervell and Company, of Acton, W., state that they are in a position to supply jigs, tools and special fixtures of the highest accuracy and quality, the factory at Acton being well equipped for this class of work.

Trade With Russia.—The Board of Trade (Licensing Section) has announced that licenses are no longer required for the export to Russia of any goods other than goods the export of which is prohibited except under licence to all foreign countries.

Electrical and Engineering Developments, Limited.—The offices of the technical and commercial departments have been removed to 1-3, Stelgate Road, London, S.W.11. (Telephone No.—Latchmere 4216.) The company retains a private office at 82, Victoria Street, S.W.1.

Bute Works Supply Company, Limited, have issued No. 1 of their new periodical Stock Bulletins of Industrial, Railway, and Works equipment. It is a comprehensive and detailed list of goods available for immediate delivery, special attention being drawn to many noteworthy second-hand values which are offered,

Witton M. L. Circuit Breakers is the title of a well-printed and illustrated pamphlet (X 2389) issued by the General Electric Company Limited, Magnet House, Kingsway, W.C. Specifications, particulars and prices are given, with diagrams and dimensions of the various types supplied for industrial power purposes.

The General Electric Company, Limited, have transferred their head office, sales department and stores to fine new premises at Magnet House, Kingsway, W.C.2. The new telephone number is Regent 7050. The G.E.C. recently published a new catalogue of their Osram electric lamps, showing the new scale of reduced prices. In the preface to a well illustrated and substantial production it is stated that extensive additions to the company's lamp works are in hand, including new research laboratories.

Nobel Industries, Limited.—The Office of Woods and Forests has given permission for the Buckingham Palace Hotel in Buckingham Palace Road to be known as Nobel House. The reconstruction of the hotel and its conversion into business premises for Nobel Industries, Limited, is nearing completion, and the top floor is now occupied by various departments. It was recently announced that Nobel's Explosives Company, Limited, of Glasgow, a constituent company of Nobel Industries, Limited, had decided to dispose of their Glasgow offices in view of the coming move of their staff to London.

PATENT LIST

Abstracted for "The Tramway and Railway World" from the Official Journal of Patents.

***** If the inventions have been communicated the names of the communicators are given in italics.**

Applications for Letters Patent.

The number of the patent is given in brackets.

Propulsion of vehicles (6,894)—E. W. Brackenbury.
Motor vehicles (6,580 and 6,582)—L. M. Brown.
Direction indicator (6,706)—G. N. Corlett.
Ticket racks for tram conductors (6,856)—J. R. Cross.
Steering mechanism for motor vehicles (6,751)—F. Gilding.
Electrically-propelled vehicles (7,019)—J. P. Kemp.
Propulsion of motor vehicles (6,989)—J. J. J. M. Kluijtmans.
Tram-ticket holder (6,545)—H. Taylor.
Automatic emergency brake attachment (7,009)—A. Toms.
Brake shoes or skids (7,058)—N. E. Willis.
Tram rail (6,689)—J. A. Yeadon.
Steering axle end for motor vehicles (7,869)—S. E. Alley.
Ticket punches (7,259)—M. T. Anson.
Collapsible tram, etc., top cover (7,652)—A. E. Boudry.
Electric power transmission and braking systems (7,559)—British Thomson-Houston Company, Limited (*General Electric Company*).
Motor vehicles (7,737)—N. P. Burgess.
Electrically-propelled vehicles (7,591)—J. E. Hamilton and Industrial Appliances, Limited.
Bodies of motor vehicles (7,431)—H. Heal.
Life-guards for motor vehicles (7,835)—R. H. Jones.
Reversing gearing for motor vehicles (7,280)—H. E. A. Nunn.
Life-guard for mechanically-driven vehicles (7,277)—J. O'Shea.
Tunnels for combined road and rail traffic (7,483)—J. J. E. Sloan.
Motor vehicles (7,339)—H. Stanhope.
Safety apparatus for electric tramcars, etc. (7,340)—S. H. Trippe.
Lifting jacks (7,338)—C. Turner.
Devices for propulsion of motor vehicles (7,871)—V. Zboril.
Change-speed transmission gears (8,330)—W. S. Boult.
Life-saving device for tramcars and lorries (8,230)—G. A. Edmondson.
Life-guards for tramcars, etc. (8,486)—S. W. Fidler.
Self-propelling road vehicles (8,033)—G. S. Motor Company and E. E. Guinness.

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Self-propelled vehicles (8,184)—R. M. Hamilton.
Oiler for tramcar wheels (8,549)—A. J. M. Jones.
Motor vehicles (8,124)—F. A. Knapp.
Means for coupling shafts of motor vehicles (8,227)—E. Lumsden.
Driving gear for motor vehicles (8,228)—E. Lumsden.
Life-guards for motor vehicles (8,242)—W. Meiklejohn.
Driving mechanism for motor vehicles (8,159)—W. J. Patterson.
Motor vehicles (8,043)—S. Smith.
Tires of tramway wheels (8,012)—C. L. Sumpter and Vickers, Limited.
Bearings for axle boxes of tramcars (8,029 and 8,030)—C. H. Taylor.
Direction indicators for motor vehicles (8,244)—L. L. Whittaker.
Steering gear for mechanically-propelled vehicles (9,011)—R. Bishop, H. W. Egerton, and Marles Steering Company, Limited.
Motor vehicles (8,959)—E. Cassalette.
Direction indicator for motor vehicles (8,667)—S. Cockburn.
Fare systems and means used therewith (8,861)—G. B. Ellis (*Johnson Fare Box Company*).
Retaining devices for overhead trolley collecting wheels of electric tramways (8,758)—J. Ellis and R. F. Ellis.
Steps and life-guards for tramcars (8,993)—W. E. Ireland.
Variable-speed gearing for motor vehicles (9,012)—G. W. Jacobs.
Variable-speed gearing for motor vehicles (8,979)—J. E. Preston.
Internal combustion engines for self-propelled vehicles (9,173)—H. P. Saunderson.
Tramway stretcher bars (9,112)—O. R. Williams.
Accumulators for motor vehicles (9,598)—W. T. Coulson.
Steering of trailers drawn by motor vehicles (9,706)—W. F. Crane and H. Jewson.
Segmental brakes for steering wheels of automobiles (9,298)—G. Fornaca.
Device for changing speed of power-driven vehicles (9,241)—J. M. Fraser.
Lifting jacks (9,313)—W. F. Latimer and H. Pinch.
Bases of trolley poles for electric vehicles (9,604)—E. M. Munro.

SPECIFICATIONS PUBLISHED

1919.

Automatic safety apparatus for motor vehicles (27,407—*158,382*)—J. L. Watkins and W. Hesketh.
Automatic apparatus for the preventing or reducing the skidding of motor road vehicles (27,408—*158,383*)—J. L. Watkins and W. Hesketh.
Change-speed gearing for motor road vehicles (28,926—*158,417*)—Birmingham Small Arms Company, Limited, and H. Poole.
Motor vehicles (27,366—*158,638*)—Sykes and Sugden, Limited, and H. Longbottom.
Brakes for motor vehicles (27,420—*158,646*)—A. H. R. Fedden, L. F. G. Butler, and Cosmos Engineering Company, Limited.
Motor vehicles (27,421—*158,647*)—A. H. R. Fedden, L. F. G. Butler, and Cosmos Engineering Company, Limited).
Internal combustion power units for motor vehicles (27,423—*158,649*)—A. H. R. Fedden, L. F. G. Butler, and Cosmos Engineering Company, Limited.
Lifting devices for tramway vehicles (27,813—*158,690*)—R. Blake and W. B. P. Pringle.
Friction driving gear for motor vehicles (28,441—*158,725*)—F. Sirett.
Non-skidding device for motor vehicles (29,546—*158,748*)—E. Searle.
Electric trackless tramway cars (27,472—*158,962*)—G. A. Bishop and R. A. Chadwick.
Brake mechanism for motor cars (28,375—*158,995*)—H. Terry and Sons, Limited, and A. V. Terry.
Indicating apparatus for road vehicles (28,792—*159,283*)—S. Hodson.
Transmission gear for motor vehicles (28,970—*159,292*)—R. T. Zeale.
Fluid pressure braking apparatus (29,225—*144,992* and 29,226—*146,920*)—H. H. Westinghouse.
Turning and stopping indicators for motor vehicles (29,376—*159,321*)—S. H. Keen.
Guards for tramcars (25,858—*159,534*)—W. Philipson and P. C. Philipson.
Motor vehicles (29,202—*159,567*)—J. Weller.
Non-skid devices for motor vehicles (29,967—*159,605*)—E. H. Bramall and A. C. Norman.
Brake mechanism (31,375—*159,670*)—G. S. Ackley.
Axles of motor vehicles (31,640—*159,680*)—J. R. Jones.
Steering gear of mechanically-propelled vehicles (32,020—*159,688*)—A. G. Grice.

1920.

Compressed air control mechanism for use in connection with the brake cylinders of tramways, etc. (10,606—*158,478*)—A. T. Harrop.
Canopy fittings for chars-a-bancs (35,503—*158,823*)—C. W. Bunn.
Apparatus for measuring the consumption of fuel in motor vehicles (1,538—*159,085*)—F. O'Brien.
Electrically-propelled vehicle (1,768—*159,395*)—J. H. Hansen.
Overhead trolleys or collectors for electric tramways (15,572—*159,445*)—T. Blaney and D. Williams.
Wheels for motor road vehicles (144—*159,715*)—Barker and Company (Coachbuilders), Limited, and S. Penny.
Electric cables (6,249—*159,760*)—British Insulated and Helsby Cables, Limited, and E. A. Bayles.
Coupling apparatus for tramway vehicles (21,448—*159,798*)—H. Wren.

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TRAFFIC RETURNS.

Tramway and Omnibus Undertakings in the United Kingdom.

NAME OF COMPANY OR CORPORATION.	1920. WEEKS ENDED					1921. WEEKS ENDED					AGGREGATE.		
	Mar. 6	Mar. 13	Mar. 20	Mar. 27	April 3	Mar. 5	Mar. 12	Mar. 19	Mar. 26	April 2	Wks.	1921.	Increase or Decrease.
	£	£	£	£	£	£	£	£	£	£		£	£
Aberdare Corporation	...	...	...	...	...	...	...	...	...	...	...	...	...
Aberdeen Corporation	3,063	2,987	2,990	3,097	2,952	3,601	3,290	3,378	3,468	3,481	43⅝	165,715	+ 25,425
Ayr Corporation	468	466	494	496	519	544	548	549	578	665	46	34,535	+ 3,656
Barrow Corporation	716	700	735	809	843	875	880	884	948	943	52	47,021	+ 7,537
Belfast City Tramways	11,040	10,620	10,938	...	...	12,007	12,006	12,519	...	...	51	583,585	+ 55,280
Birkenhead Corporation	3,029	2,986	3,062	3,081	2,845	2,933	2,981	3,028	3,029	2,771	⅝	1,129	− 412
Birmingham Corporation	27,073	26,265	26,746	27,837	26,007	31,663	31,549	31,396	30,416	32,156	52	1,645,548	+ 276,620
Birmingham Motor 'Buses	2,328	1,645	1,805	1,927	1,737	2,284	1,860	1,866	1,932	2,324	52	104,190	+ 12,866
Blackburn Corporation	2,093	2,007	2,184	...	3,229	2,409	2,416	2,362	...	3,711	⅝	2,614	+ 1,117
Bradford Corporation	11,483	11,646	11,526	11,986	4,032	13,926	13,944	14,465	14,152	5,357	⅜	5,357	+ 1,325
Burnley Corporation	2,629	2,895	2,693	2,691	3,379	3,606	3,531	3,316	4,185	3,666	—	—	—
Burton-on-Trent Corporation ...	507	508	516	524	563	616	611	654	677	681	52	32,066	+ 5,352
Bury Corporation	2,418	2,293	2,531	2,370	1,883	2,450	2,527	2,373	2,961	1,300	⅜	1,300	− 583
Chatham and District	1,477	1,391	1,389	1,525	1,546	1,581	1,593	1,618	1,716	1,994	13	21,081	+ 2,213
Cork Electric	...	...	...	...	...	...	...	...	...	...	—	—	—
Derby Corporation	2,058	1,911	1,990	2,078	2,166	2,295	2,220	2,301	2,547	2,609	52	119,580	+ 17,207
Dundee City	2,504	2,493	2,427	2,555	2,478	3,068	3,004	3,076	3,047	3,251	45½	139,897	+ 24,509
East Ham Corporation	1,721	1,651	1,701	1,769	1,764	2,120	2,123	2,247	2,254	2,279	52	108,602	+ 10,501
Edinburgh Corporation	10,799	10,311	10,559	10,832	10,670	10,088	9,983	10,373	10,717	11,212	46	537,440	+ 50,752
Edinburgh Motor 'Buses	321	325	332	408	426	2,757	2,747	2,987	2,953	3,053	—	—	—
Glasgow Corporation	33,774	32,893	33,565	34,173	33,281	45,902	46,399	46,048	46,458	44,260	43	1,976,441	+ 549,112
Glossop (Urban Elec. Supply Co.)...	224	220	234	240	254	230	218	227	290	248	14	3,376	+ 191
Halifax Corporation	3,412	3,325	3,319	3,683	3,611	4,395	4,134	4,326	4,210	5,582	51	222,842	+ 39,109
Halifax Motor 'Buses	83	81	83	83	85	114	111	113	109	150	51	5,831	+ 1,462
Huddersfield Corporation	5,156	4,718	4,838	5,136	4,041	5,232	5,301	5,291	5,515	6,650	1	6,650	+ 2,609
Ilford U.D. Council	1,157	1,151	1,135	1,181	1,227	1,378	1,389	1,427	1,446	1,482	52½	67,872	+ 6,067
Ipswich Corporation	827	784	820	863	996	820	819	848	958	972	52	49,742	+ 2,339
Isle of Thanet...	567	542	537	653	686	560	545	572	579	1,367	25½	15,183	+ 963
Kilmarnock Corporation	309	312	311	313	...	374	353	365	375	...	—	—	—
Lanarkshire	...	...	...	...	...	...	...	...	...	...	—	—	—
Leicester Corporation	4,892	4,933	5,844	6,093	6,339	6,550	6,330	6,474	6,553	7,547	—	—	—
Leyton U.D. Council	...	...	...	...	...	...	...	...	...	...	—	—	—
Liverpool Corporation	25,914	25,233	26,145	27,400	25,601	29,958	29,506	32,568	29,649	30,853	131	372,762	+ 34,905
London County Council	77,936	77,904	76,893	81,842	81,006	97,887	96,945	98,594	99,172	99,166	52	4,780,657	+ 643,721
Maidstone Corporation	367	348	345	388	330	416	412	420	445	525	52	24,873	+ 4,802
Manchester Corporation	30,941	29,446	31,105	31,680	16,510	38,100	37,884	37,334	38,986	25,696	52½	1,823,585	+ 235,820
Newcastle-on-Tyne Corporation ...	9,372	8,947	9,238	9,429	9,216	11,250	11,280	11,305	11,612	14,081	1	14,081	+ 4,865
Nottingham Corporation	7,244	7,177	7,239	7,548	6,807	7,451	7,348	7,574	8,215	8,479	52	402,366	+ 24,168
Oldham Corporation	4,484	4,518	4,896	4,729	4,484	4,408	4,592	4,531	5,040	5,046	2	7,539	+ 191
Reading Corporation	1,555	1,520	1,552	1,639	1,685	1,513	1,512	1,562	1,663	1,752	52	86,176	+ 3,178
Reading Motor 'Buses	174	158	154	166	148	255	246	270	296	387	52	13,909	+ 11,582
Rotherham Corporation	...	...	...	...	...	...	...	...	...	...	—	—	—
St. Helens Corporation	1,776	1,728	1,743	1,873	439	2,098	2,078	2,125	2,016	468	52	109,434	—
Sheffield Corporation...	19,521	19,388	19,989	20,315	19,541	20,019	20,062	20,411	20,270	22,111	1	1,101,574	—
Southampton Corporation	3,049	2,895	2,814	3,118	3,159	2,929	2,934	2,964	3,056	3,474	52	163,245	+ 16,152
Southampton Motor 'Buses	203	189	175	214	200	184	176	180	180	179	52	12,329	+ 6,821
Southend Corporation	1,454	2,895	1,435	1,608	1,598	1,682	2,934	1,729	1,733	3,200	51	118,263	+ 14,514
South Shields Corporation	1,489	1,431	1,453	1,492	775	1,883	1,883	1,897	2,033	1,391	52	100,887	+ 25,763
Sunderland Corporation	2,803	2,754	2,882	2,885	...	2,757	2,730	2,864	2,902	...	52	155,342	+ 7,507
Swindon Corporation	329	329	318	358	396	366	355	369	370	468	52	20,075	+ 1,344
Tynemide Tramways and Tramroads	1,044	1,020	996	1,084	1,016	1,156	1,096	1,157	1,170	2,386	13	15,755	+ 2,683
Wallasey Corporation	2,295	2,179	2,315	2,361	2,344	2,561	2,588	2,619	2,600	2,978	52	136,460	+ 7,884
Wallasey Motor 'Buses	...	...	...	...	...	146	157	162	158	242	52	8,838	—
Walsall Corporation	1,630	1,572	1,592	1,644	861	1,862	1,825	1,885	1,924	1,645	52	95,092	+ 14,958
Walsall Motor 'Buses	707	668	693	710	432	1,270	1,230	1,229	1,340	1,197	52	62,053	+ 29,887
Walthamstow U.D. Council ...	1,815	1,788	1,802	2,020	2,196	1,880	1,879	1,931	2,152	2,235	—	—	—
Warrington Corporation	973	953	967	966	1,044	1,098	1,060	1,072	1,088	1,085	52	52,772	+ 5,218
West Ham Corporation	5,182	5,115	5,108	5,437	5,528	6,041	6,081	6,143	6,266	6,649	52½	305,493	+ 26,897
Wolverhampton Corporation ...	2,335	2,249	2,200	2,376	2,326	2,240	2,340	2,218	2,275	2,621	52	125,333	+ 14,922
Wolverhampton Motor 'Buses ...	348	345	354	358	358	629	610	630	603	852	52	25,166	+ 9,627

Colonial and Foreign Tramway Traffic Returns.

Companies Issuing Weekly Returns.

NAME OF COMPANY.	1920. WEEKS ENDED.					1921. WEEKS ENDED					AGGREGATE.		
	Mar. 6	Mar. 13	Mar. 20	Mar. 27	April 3	Mar. 5	Mar. 12	Mar. 19	Mar. 26	April 2	Wks.	1921.	Increase or Decrease.
	£	£	£	£	£	£	£	£	£	£		£	£
Anglo-Argentine	88,165	75,786	72,773	75,785	73,232	81,890	82,703	84,018	72,461	79,540	13	1,035,192	+ 91,839
Calcutta ... ... Rs.	105,165	88,590	88,368	89,227	87,053	84,495	80,635	83,385	76,072	82,294	13	822,475	− 388,731
Madras... ... ... Rs.	...	(2 weeks)	49,949	(2 weeks)	54,985	...	(2 weeks)	41,016*	(2 weeks)	56,919	13	145,644	− 126,144
Pernambuco	8,100	7,784	8,078	6,909	7,438	4,538	4,597	4,063	3,606	3,782	13⅞	59,146	- 49,767

* Decrease owing to Strike.

Companies Issuing Monthly Statements only.

	1919.			1920.			1920.			1921.			Wks.	AGGREGATE.	
	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.		1920-21.	+ or −.
	£	£	£	£	£	£	£	£	£	£	£	£		£	£
Ballarat & Bendigo	4,176	4,244	4,220	5,119	4,249	...	4,441	4,810	4,601	5,342	4,593	...	44	47,531	+ 6,133
Brazilian Trac. Mlns	9980,000	9796,000	9739,000	9655,000	9381,000	...	13442000	12199000	12600000	12875000	11941000	...	9	24,816,000	+ 5,780,000
Brisbane	43,530	...	...	...	...	...	46,300	...	...	...	...	...	43	459,330	+ 69,420
British Columbia	$710,405	733,981	783,324	828,709	746,030	...	781,706	805,633	868,677	868,202	792,590	...	35	6,370,501	+ 573,846
Buenos Ayres L'c'z.	49,692	50,634	55,873	52,643	52,468	55,000	57,619	56,747	62,857	61,111	53,952	59,365	39	510,714	+ 57,027
Burma	51,898	46,755	43,571	41,750	...	45,117	55,763	53,679	50,481	50,036	...	50,930	34	408,826	+ 51,086
Cape Town ...	...	...	...	...	...	...	...	25,628	29,768	...	...	...	—	—	—
Carthagena & H. ...	1,465	2,549	2,923	4,748	4,008	3,493	3,319	2,714	5,560	3,877	2,839	2,226	13	8,942	− 3,307
Cordoba	17,606	11,255	14,923	16,350	...	...	19,636	19,141	19,307	18,703	...	...	44	197,186	+ 31,988
East India ...	2,855	2,709	2,916	2,988	3,001	3,592	4,299	4,234	4,271	4,299	3,819	4,168	35	33,427	+ 9,774
Kalgoorlie	3,095	2,859	2,560	...	...	...	3,094	2,969	3,140	...	...	...	52	36,812	+ 3,760
La Plata	6,194	4,905	...	*3,145	5,892	...	6,310	5,573	...	6,506	*727	...	9	7,234	− 1,814
Lima	50,087	...	...	...	...	...	49,054	...	...	...	...	...	44	54,261	+ 2,151
Manila ...	*242,441	248,350	276,730	278,451	278,437	...	327,652	320,345	315,599	321,450	306,389	...	9	627,839	+ 71,651
Monte Video ...	...	40,308	...	...	45,259	...	...	43,846	...	...	48,119	...	17	191,763	+ 14,054
Para	27,849	25,421	24,412	24,306	24,292	...	26,784	24,285	24,253	24,231	22,596	...	13	71,080	− 1,930
Peruvian ...	$1179,130	1285,000	...	...	...	...	1187,160	935,050	...	...	...	...	22	5,633,655	− 38,239
Port Elizabeth	...	...	...	...	...	...	...	6,620	8,185	...	...	...	—	—	—
Rangoon	7,678	7,379	7,517	R112000	...	...	7,455	6,964	8,000	R122558	...	...	5	R122,558	+ 10,558
Toronto ...	$1123,801	1111,177	...	1130,486	1113,717	...	1218,290	1250,414	...	1274,251	1228,722	...	9	2,502,973	+ 258,770
Winnipeg ...	$428,339	461,449	...	498,837	444,873	...	444,899	477,957	...	506,229	460,125	...	9	966,354	+ 22,644

* Strike of employees.

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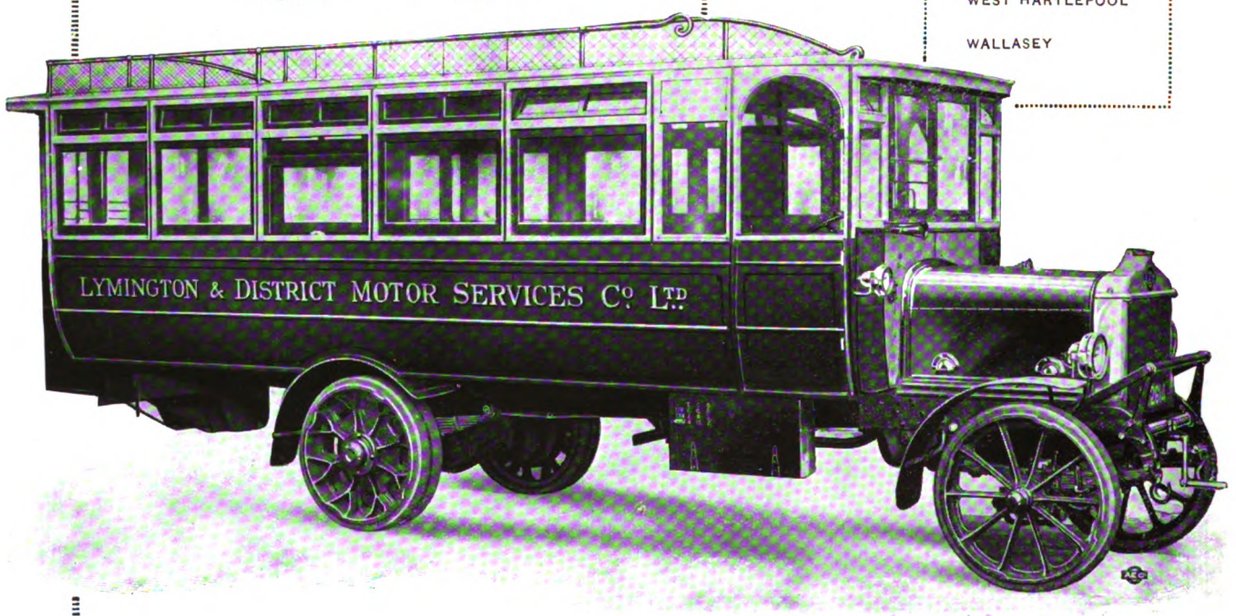

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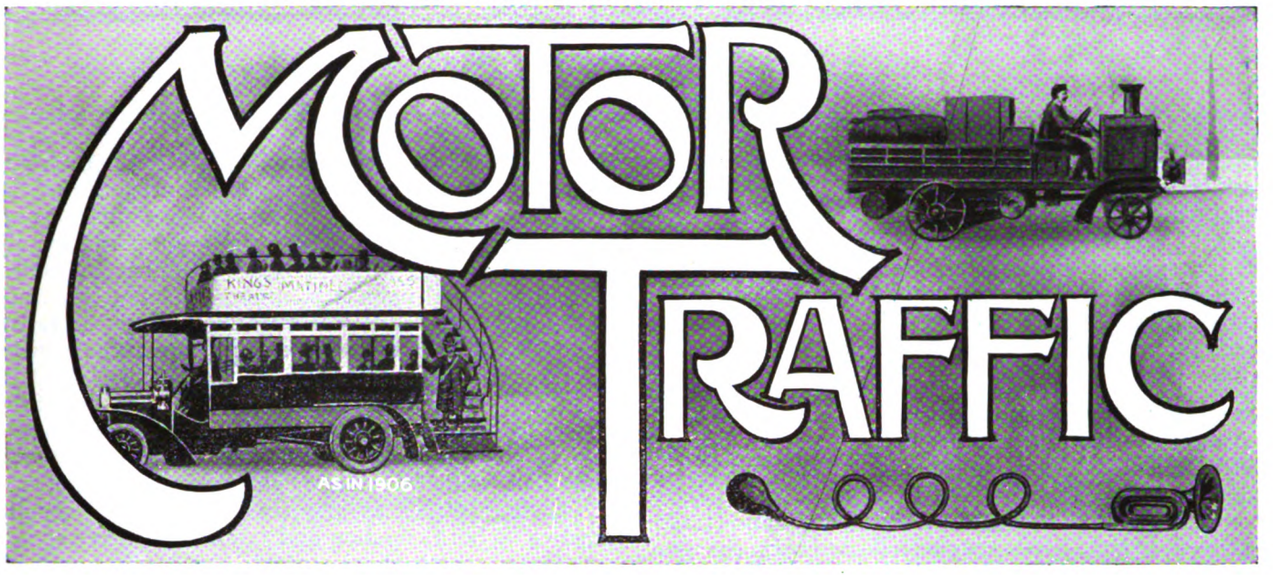

SHOULD PURCHASES BE DELAYED?

The very sudden change in the relations between supply and demand which took place during the latter portion of 1920 naturally brought with it a tendency towards a lowering of prices. In a fair number of instances quite substantial reductions have been notified in respect of the prices of motor vehicles. It is obvious that, when business suddenly falls off and stocks begin to accumulate in all quarters, there is a likelihood of some suppliers being compelled to dispense with their material even at a loss because they cannot afford to lock up indefinitely the capital represented by stock which finds no ready market at the price at which it was originally designed to be sold. It also follows that, when a tendency towards price-cutting becomes noticeable, prospective buyers begin to ask themselves whether by waiting a little longer they may not be able to purchase at even more advantageous terms. Thus when the natural demand is small, there is a likelihood that it will be even further diminished by the deliberate withholding of business in prospect of a further fall. Thus anything in the nature of a slump tends to be perpetuated. It does not, however, follow that a policy of delay at such times is really correct. As a broad principle, it is certainly not so. It means that orders are withheld from industry just when they are most needed and accumulate so as to mature later on in almost embarrassing numbers when, perhaps, the facilities for production have been very much reduced.

* * * *

The individual purchaser, however, naturally looks at the question from his own point of view and not from that of the general welfare of the industry with which he is dealing. From this latter standpoint he may arrive at a different conclusion. In the case of the commercial motor vehicle, however, instances in which it is really good policy to postpone purchase in anticipation of a fall in price are decidedly rare. The motor vehicle is not something which, if it is really needed, can be dispensed with without loss. A decision to buy motor omnibuses, coaches or lorries is presumably reached because it is confidently anticipated that the use of these vehicles will either represent a direct gain to their owner or else will increase the value of his main business. To delay in placing an order under such circumstances may well be to incur a very considerable and steadily accumulating loss either of trade or of revenue. Suppose, for example, that a profit of £20 a week can be made out of a motor coach during the appropriate season of the year. If a couple of months are lost before the vehicle is placed upon the road, a profit of something like £160 is foregone and it is, to say the least of it, most unlikely that the delay will make it possible to purchase the vehicle at terms which will neutralise this loss. Similarly, the trader who finds the need of additional motor vans for delivery purposes, probably owing to the possession of similar facilities by his competitors, is sacrificing goodwill and business every day and every week if he defers putting those vans into service. Losses of this kind are a certainty, whereas the possibility of ultimate purchase at a lower price is not a certainty. Moreover, reductions in price are only commercially justifiable if the cost of production is reduced either by the cheapening of materials or of labour or else by the increase of output. One does not see how any great economies can be effected in any of these directions just now, therefore any large reductions in price must almost always mean that the manufacturer is sacrificing his reasonable profit. He will only adopt this course when compelled to do so and consequently, as a general rule, the greater the price reductions the more likely does it become that the supplying firm will ultimately find itself in an unsound financial position and will be obliged to give up business. In that event the user suffers immediate loss in the market value of his vehicles and finds himself faced with increased difficulties in operation, because his natural source of supply of spare parts and replacements is no longer open to him. On the whole, then, the policy of deferring purchase on the off-chance of some reduction in price is one which can very seldom be recommended in respect of motor vehicles of the commercial or public service types.

BUSINESS FROM OVERSEAS.

Another fact which certainly affects the position in respect of the placing of orders for vehicles required for use in oversea countries is that there is at present an inclination on the part of many Governments to secure revenue by increasing their import duties. By way of example, let us take the case of Spain, which increased its tariffs threefold in November last at very short notice. It is clear that anyone in that country who was at that time contemplating, let us say, the

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MOTOR TRAFFIC

purchase of motor omnibuses, but was holding up the business on the chance of a fall in prices, must now, despite any such fall that may have occurred, pay even more highly on account of the big duty payable on the entry of the vehicle. Similar examples are to be found in Belgium where the duties are now being much increased, and also in India where the Legislative Assembly has decided upon a similar policy for revenue purposes.

EFFECT OF QUARTERLY LICENCES.

The new system of taxation by payment for licences the useful life of which terminates at the end of the calendar year or quarter, is having the most detrimental effect upon the motor industry and trade, which effect must necessarily be reflected upon the user. Any scheme in which a man is compelled to pay for something he does not get is obviously open to criticism, and it is apparent that if, for example, anyone buys a motor vehicle on March 10, it is not fair that he should pay for three months' use of that vehicle and only receive a licence permitting him to use it until March 31. The natural objection which anyone feels against being put into such a position has the consequence of deferring business which would otherwise have been done during the last month of each quarter. The result is a tendency for the great majority of orders to be put through with a view to delivery at the beginning of each quarter so that the licences taken out will really represent something like the value of the money paid for them. This, of course, means that vehicles ready for delivery, say, in February, are not taken up until, say April, and so on throughout the year. Thus completed vehicles do not pass into and out of stock naturally in accordance with the ordinary laws of supply and demand, but stock tends to accumulate at the end of each quarter. This represents capital unnecessarily lying idle, no good purpose being served unless, perhaps, it may be that the officials responsible for the issuing of licences have their work to a very slight degree simplified. It is natural enough that officials in any such position, when called upon to devise regulations, will endeavour so to frame those regulations as to make them easy to apply. They are not directly concerned with the question of whether in doing so they complicate the business of an important industry and trade and put yet another stumbling block in the way of that industry's prosperity. The arguments of the motor trade on this subject were, of course, put forward in ample time to ensure their consideration. Nevertheless they were ignored, and it seems to us time to protest that in matters of this kind the welfare of industry should be given more consideration than the convenience of officials who are, after all, appointed to perform functions for the benefit of the public and not necessarily to lighten their own work at the expense of other people.

CAUSES OF FAILURE.

It would be absurd to maintain that in every instance in which motor vehicles are adopted for haulage or delivery work, complete success is attained. On the other hand, it would be equally incorrect to maintain that in cases of comparative failure the blame must fall on the vehicles or on those immediately responsible for their operation. More often than not unsatisfactory results are due to the insistence of the vehicle owner upon an unduly high daily output, reckoned in ton-miles. To secure an exceptionally high ton mileage within a given number of hours, beyond which drivers and other employees will not work, it is necessary either to indulge in excessive speeds or else to put excessive weights upon the vehicle. In either case depreciation of the mechanism must be rapid, and the time will come when the reliability of the service will suffer owing to serious breakdowns. No vehicle can be blamed if it fails to do punctually something which it was never designed to do, and overloading, either as an occasional or as a regular practice, is both common and fatal. Excessive speeds are almost equally detrimental. Yet another cause of trouble resulting from the desire to get as much useful work done as possible is neglect of proper provision for cleaning, for regular examination, and for periodical overhaul. The vehicle is kept so long on the road that there is no time for proper attention to be given to it in the shop. The result is that little matters, which could have been detected and rectified in a few minutes, develop into the causes of serious accidents, and the vehicle or those responsible for it are blamed when, as a matter of fact, neither has been given a fair chance.

RAILWAYS AND ROAD TRANSPORT.

The Committee which has been considering the powers of the railways to operate road services has issued its report, or, more correctly, has issued three reports in various terms. On one point the Committee appears to be unanimous, and this is that the railways should not have unrestricted powers. The most that is suggested, even by the railway representatives themselves, is that powers should be given but should be restricted by the Traffic Acts and by clauses providing that certain conditions must be fulfilled before road services can be inaugurated. In addition, it is advised that charges should be controlled by the Ministry of Transport, responsible to Parliament and acting solely in the interests of the public. The bulk of the Committee do not advise going even so far as this, but hold that no new powers should be given, while the representative of the United Vehicle Workers is really in agreement with the latter view, but feels it necessary to advocate nationalisation of all forms of transport as the only complete solution of the problem. Altogether it seems clear that, unless the Minister ignores the advice of his Committee, any powers that might be given must be of an extremely restricted character and must really be granted only because, if they were withheld, it would only be necessary for the railways to form nominally independent companies for the running of road services, the operations of these being subject to little or no restriction.

EASTER TRAFFIC.—Notwithstanding the unfavourable weather during the latter half of the Easter holidays, there was a great demand for coach trips from London. The same remark applies to the omnibus services of the London General Company to country places within a thirty miles radius. Queues were to be seen at the starting places in the mornings and afternoons, notwithstanding that the services were greatly augmented.

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MOTOR TRAFFIC

SIR E. GEDDES ON ROAD IMPROVEMENT.

The Return for Increased Taxation.

The Minister of Transport was to have been the chief guest at a luncheon of the Commercial Motor Users' Association on April 6, but his duties in connection with the national crisis prevented him from attending. In a letter which was read from him, Sir E. Geddes regretted that both he and Sir H. Maybury, director-general of roads, were unable to be present. The letter proceeded—

We have followed in the footsteps of the Road Board ; we largely adopted their aims, and adapted the measures to attain those aims to the changed conditions following the war. Roads—like every other form of movement in this country, the railways, tramways, canals, and the movement of power from place to place through the medium of electrical energy—have all grown up on a localised, parochial basis, but they are all through continuous processes and should be interchangeable. They are all the victims of the "break of gauge" due to their parochial growth. There has been no real national attempt to abolish this "break of gauge." Each local authority has developed on its own lines : the rich ones have done much for roads, the poor ones have been unable to do much, and their interests have not always been to develop national through routes, but rather those more important to their local needs.

A National Policy.

To obtain a national system of roads a national policy was necessary. The burden of road improvement—and, indeed, of maintaining the roads at all—with the great increase of mechanical traction following the war, was obviously too heavy a task for the local authorities. It was no use attempting to classify roads on a national basis unless some national share was to be taken in the development. The classification of roads is now complete, and the percentage of first-class and second-class roads is as follows—

England and Wales—first-class roads ...	11·6	per cent.
England and Wales—second-class roads ...	7·0	,,
Scotland—first-class roads	17·9	,,
Scotland—second-class roads	13·1	,,

To assist the local authorities in improving these roads, and bringing them on to the same gauge throughout—(by "gauge" I mean a uniform standard of excellence as regards alignment, gradients, surface, camber, and strength)—money was necessary, and I think it has seldom, if ever, before been found in the history of taxation that the people who were going to be taxed were on the whole the greatest supporters of the measure. The old petrol taxes yielded some £2,500,000 a year. The new taxes were estimated to yield £8,500,000 a year gross, and up to the end of March, 1921, they in fact yielded £7,785,000, leaving only three-quarters of a million pounds more to be raised from quarterly licences ; this sum should readily be attained, as quarterly licences for the first two months of the year yielded well over £200,000. We may therefore say that the estimated yield from the new taxation is about as accurate as such an estimate could have been, and also, as far as one may judge, that the whole of the additional burden has fallen upon the commercial motor users and not upon the private motor owners, which latter class provided the greater portion of the previous taxation, but are to-day, as a whole, not paying any increased amount proportionately. Now, in return, what have the commercial motor users obtained for their increased taxation ? We are to-day on the threshold of a vast improvement in roads. For the first time the maintenance as well as the improvement on a national basis of through routes—of a "throughout gauge," to continue my metaphor—has been adopted, and in addition an estimated one and a quarter million pounds a year out of the fruits of this taxation is allotted to contributions towards new arterial roads.

Probability of a Reduced Tax.

Since the armistice vast sums have been spent upon roads out of accumulated funds or special grants and through the increased efforts of local authorities. In the financial year 1913-14 the expenditure on roads was £19,000,000 sterling. In 1919-20 it was £33,400,000, and in 1920-21 it is estimated at £45,000,000 sterling. These sums are colossal, and represent a great effort upon the part of the local authorities, and at the same time a very great effort from the road users. Without this expenditure I cannot think what the state of our roads would have been. Moreover, with the valuable comparative cost figures which we obtain, and which the Ministry is able to check and criticise by comparison of district with district, the local authorities are enabled to exercise greater and increasing economy in this very important work. Any impartial observer cannot but admit that, considering the years of war and the tremendous increase of traffic, the roads of the country are showing as a whole remarkable improvement. We have a great deal of leeway to make up, but with the increasing number of motor vehicles, with the improvement in road service, and the decreased wear of the road following upon the general introduction of rubber or improved tires, I feel that not only may the road users look forward to a continued great improvement of roads, but also to the probability of a reduction in the scale of the tax.

The Future of Road Transport.

Apart, however, from this, the road users have obtained other statutory advantages. Local restrictions and the local point of view in imposing conditions upon commercial motor users before allowing them to use their roads are guarded against by appeal to a central authority. You are paying substantially to maintain and improve the roads, and you have been safeguarded against local prejudice. We have wiped off, out of the proceeds of motor taxation, the whole of what was known as the "assigned revenues" to the local authorities, and now all licences, fees, and penalties for motoring offences which used to go to the local authorities come to the central fund. The old complaint, which may or may not have had justification, that penalties imposed locally on motorists went to the benefit of the locality, can no longer be made. These are only some of the comparatively minor advantages. The great outstanding feature is this, that for the first time we now have a national system in through roads, and we have the funds from which a fair and very important contribution can be made to the local authorities. The restrictions as to the free use of roads and the parochial interest have been eliminated, and with these great foundations laid I think we may look forward with confidence to a steady improvement in road transport. After I relinquish my office on August 15, I hope that I shall see this development and improvement continuing upon the lines which—with the help of Sir Hy. Maybury and the Roads Department, the motor transport industry, and the local authorities—it has been my privilege to initiate.

Sir Arthur Stanley (chairman of the Royal Automobile Club) congratulated the association on having added 2,000 firms to their strength during the past year, bringing the membership up to over 6,000 firms representing more than 50,000 commercial vehicles.

Major-General S. S. Long (vice-president) responded, and said the association was undoubtedly a national asset. He deprecated any idea that the motor industry should be placed under one common control. Labour had been advocating for some time that there should be nationalisation of all means of transport. Wherever it had been tried it had ended in disaster or curtailment of the general advancement, and there could be no doubt that any form of nationalisation, no matter what it might be, must inevitably tend to a dead level, and, eventually, to inertia.

COACH TRAFFIC BY-LAWS.

The Highways Committee of Essex County Council recall that in January last they were in communication with the Ministry of Transport with a view to evidence as to the nuisances caused to residents in the county by the conduct of persons travelling on motor coaches being submitted to the Departmental Committee on the Regulation of Road Vehicles. The Ministry of Transport, however, referred the Council's communication to the Home Office for attention, and as the latter had made no reply, the committee think the matter should be considered by the County Councils Association. They accordingly recommended that the association be requested to take the question of nuisances arising from coach pleasure traffic into their consideration, and to urge the proper Government department to deal with the subject without delay by legislation, or the framing of model by-laws, as may be found necessary.

Important Regulation at Chester.

Chester Corporation have adopted the recommendation of the Watch Committee that coaches should be loaded and unloaded in the public garage which the Corporation is providing at the Little Roodee, or at other garages in the city, but not in the streets. Letters protesting against the adoption of these regulations were received from the Chester Traders' Association, and also from the Cheshire and North Wales Motor Chars-a-bancs Owners, but without any discussion the new regulations were adopted by the Council.

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MOTOR TRAFFIC

RAILWAY COMPANIES AND ROAD TRANSPORT.

DIVERSE VIEWS OF COMMITTEE OF INQUIRY.

A white paper issued on April 6 contained three reports presented by the Committee appointed by the Ministry of Transport in January to consider "whether it is desirable that the railway companies should have general or limited power to carry goods by road."

The first report is signed by Mr. J. H. Balfour-Browne, K.C. (chairman), Mr. A. Watson (general manager, L. and Y. and L. and N.W. Railways), and Sir T. Williams (late general manager L. and N.W. Railway). The following comment in this report is interesting in view of the present crisis—

"One of the objections to the granting of general powers to railway companies to carry goods by road was that it would have the direct effect of increasing the power of railway workers' unions, and that, in the event of another railway strike, it would be more difficult for the Government to cope with such an emergency by reason of the greater power of the National Union of Railwaymen, and by the diminution in the number of independent carriers on roads. This objection is, in our view, one with which we need not deal in this place. It was pointed out that what is called the Triple Alliance still exists—and it is clearly not for us to suggest the means by which this country is to be governed in case of any such large sectional disturbance."

GRANT OF RESTRICTED POWERS ADVOCATED

"The railway companies have, we understand, from assurances which have been made to us, no intention to attempt to obtain a monopoly by the cutting of rates; but it ought, in our opinion, to be made certain that in exercising the powers of road carriers they should be subject to such restrictions as would make such a thing impossible. We understand that at the present time, owing partly no doubt to the increase of railway rates, which were sanctioned by the Minister of Transport, and were made in January and in September, 1920, a considerable bulk of good paying traffic has been and is being diverted from the railway companies' lines, and the railway companies naturally desire, if they can, to recover that traffic either by the railways or, if this is impossible for short distances, by means of road traction."

Road traction, it is pointed out, has considerable advantages for certain distances over transport by rail. If the process of abstraction of traffic went on, there might in the end be such serious difficulty in carrying on railway traffic at reasonable rates that it might lead to great increases of the charges which the railways would have to make. "We have come to the conclusion," the report continues, "that railway companies cannot expect to recover the traffic which has been diverted (or keep the traffic which in our view might be diverted in the future) by giving greater facilities on the railway, or by reducing railway rates, and under these circumstances we have come to the conclusion that railway companies ought, under certain stringent conditions, to be allowed to carry goods by road."

"We share the feelings of the traders," it is stated, "that it would be something in the nature of a calamity if railway companies secured a practical monopoly of the road transport of this country, as they have secured a practical monopoly of the railway traffic; but we are of opinion that it is not beyond the capacity of Parliament so to restrict the railway companies in the exercise of the powers to be conferred as to secure that no such results as those which are feared would be thought about."

"On the whole we have come to the conclusion that the railway companies should have general powers restricted and limited first by the Traffic Acts, second by a clause similar to Section 9 of the Ministry of Transport Act, and third by the control of charges by the Minister of Transport, whose sole duty it would be to act in the interests of the public, and who would, of course, be responsible for the exercise of these duties to Parliament. Some of our colleagues seem to think that it would be desirable to allow railways, with their present powers, to fight out by means of competition with the independent carriers by road the question of which was the fittest to survive, and think that there would be no injustice done if the same fate befell railway companies in the future that befel stage coach proprietors and the owners of canals in the past. We cannot contemplate such a fate for the railways of this country, who possess a nominal capital of £1,300,000,000, without seeing that such an end to railway enterprise would mean widespread ruin and a national crisis from which the State could scarcely hope to recover."

AN OPPOSITION REPORT.

The second report is by Messrs. H. Currington (Federation of British Industries), G. A. Dutfield (Alliance of Commercial Road Transport Associations), J. J. Hughes (Association of Chambers of Commerce), and E. S. Shrapnell-Smith (Commercial Motor Users' Association). They say they have reluctantly been compelled to come to the conclusion "That it is not desirable that railway companies should have general or limited power to carry goods by direct road services, and that their present powers are sufficient for all the legitimate purposes of a railway company, namely, the carriage of goods by rail and the collection and delivery of goods in connection with transit by rail. We use the word 'reluctantly' because we are aware that certain railway companies have from Parliament power to carry goods by road even when they have not been upon the railway, and it does seem anomalous that other companies should be refused the powers and privileges which have been conceded to the North Eastern, Great Eastern, North Staffordshire, and Great North of Scotland Railways, although the evidence submitted indicates that some of these companies are not using their power at present, and others only to a limited extent. We note, however, that some railway companies have to some extent been a law to themselves, and have even without statutory powers entered upon the trade of road hauliers, and are at present competing with the ordinary carriers by road. The evidence submitted by those connected with large federations of traders had been unanimously to the effect that, if railway companies are given the powers they seek, there would inevitably be immediate and unequal competition between them and the independent carriers by road, and that the result of that competition would, owing to the fact that the railway companies were very powerful and rich corporations, be the extinction of the independent road transport. We have come to the conclusion that that result might follow even with restricted powers, and we therefore recommend that railway companies should have no further statutory powers in connection with direct road motor transport."

REPORT OF THE LABOUR REPRESENTATIVE.

Mr. B. Smith (United Vehicle Workers), in a third report says, "With the full support of those whom I represent, I am not disposed to recommend that railway companies be given any further powers without their first proving by the efficient application of their present powers that they are prepared to give the public better service. I am, however, in favour of granting powers to the railway companies to establish what may be called 'test services' in agricultural or other sparsely populated areas purely for development purposes. The great advantage of road transport is that it involves no construction of permanent ways if the road is there. If a service is established, and proves that it is unnecessary, it can be diverted to another route without loss of capital involved in the abandonment of permanent ways, etc. Apart from that exception, I am not in favour of any extension of the existing facilities of railway companies to carry road transport."

TRANSPORT MINISTRY ECONOMY.

Sir Eric Geddes (Minister of Transport), in a written reply to Major Glyn, states that in view of the necessity for limiting public expenditure, he has had to inform local authorities and others who had submitted schemes to the Development Department that it would be impossible to give assistance from public funds during this and the next financial year to any schemes, however desirable in themselves. None of the sum of £1,000,000 voted by the House last year for the assistance of transport schemes had been expended on such schemes. The total cost of the department to the end of January was £30,555—about 8 per cent. of the cost of the Ministry as a whole. The reduction in expenditure made possible a reduction in the staff of the Ministry, details of which would be given in the estimates.

INUTILITY OF MIRRORS ON TRAMCARS.—In October last the London County Council decided to inform the Departmental Committee appointed by the Ministry of Transport to inquire into the taxation and regulations of motor vehicles, that in its opinion all vehicles should be fitted with a mirror to enable the driver to see overtaking traffic. The Highways Committee suggested, and the Council agreed, that tramcars should be excepted from this proposal, because the use of mirrors would be of little practical value in the case of tramcars which follow a fixed track.

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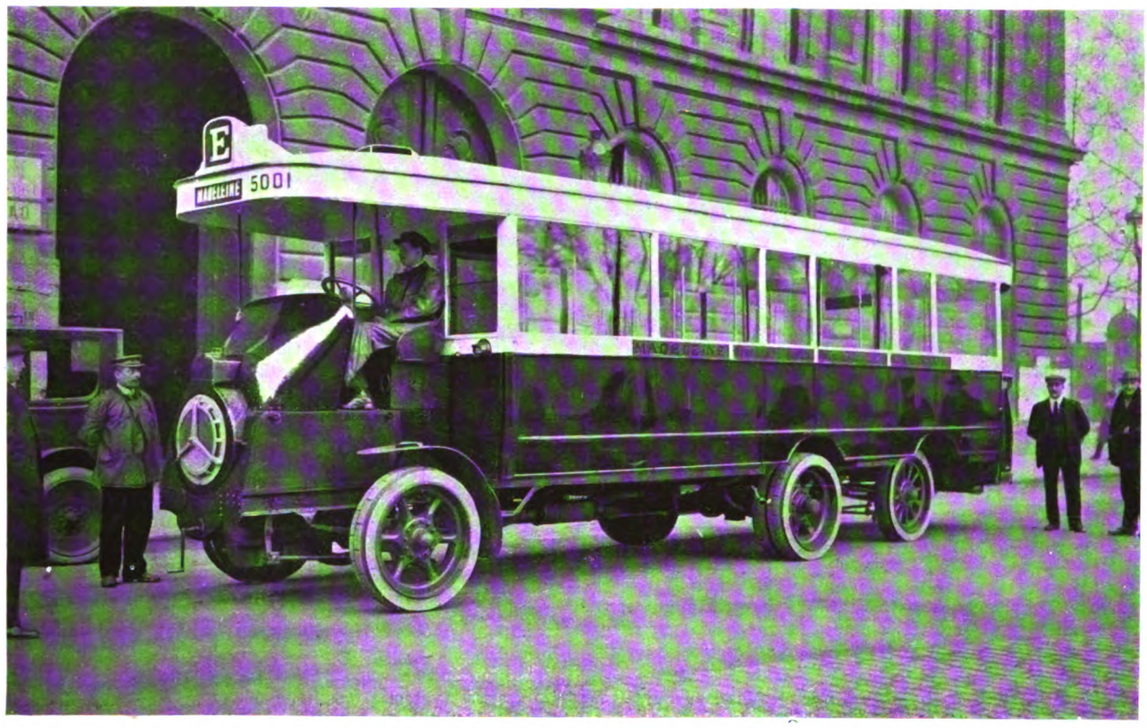

New Six-Wheeled Omnibus Operated in Paris, providing large seating capacity.

Four-Wheeled Omnibus in general use in Paris.

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OMNIBUSES FOR ST. HELENS.

THE BILL PASSED WITH MODIFICATIONS.

On March 15 and 16 the Local Legislation Committee of the House of Commons, presided over by Sir W. Middlebrook, considered the St. Helens Corporation Bill, which sought powers to run motor omnibuses on thirteen routes in and out of the borough, to expend £12,000 for omnibuses, and £10,000 for garages.

Mr. Jeeves, K.C., for the Corporation, said that by the Roads Act and Finance Act of last year Parliament had, by taxing all motor vehicles, provided, according to Sir E. Geddes, for the maintenance and improvement of highways, so that there was no necessity for a Corporation or any company running omnibuses to make special payment for using such highways outside their own area. In a circular issued early this year the Minister of Transport drew attention to this legislation, and said he would consider any further payment than the taxation inequitable unless there were "special abnormal circumstances."

INTERPRETATION OF MINISTRY'S CIRCULAR.

Mr. Charteris said that in view of that circular, the Lancashire County Council did not press their contention with regard to maintenance of highways, but would ask for payment for road adaptation.

Mr. Jeeves submitted that the taxation contribution covered both maintenance and adaptation, and that the Corporation should be unrestricted user of the highways.

Mr. A. Rudd, chairman of the Tramways Committee, gave evidence that St. Helens was growing north, north-west, and west of the borough, and that it was thought better to run omnibuses to the outer districts than to extend their tramways. In certain cases the car lines were worn out, and the committee wanted power to run on these routes trackless trolleys, if that system were found cheaper and better than relaying these lines. With regard to the proposed short length into Widnes, St. Helens was willing to come to an arrangement for Widnes to run that service.

In cross-examination by Mr. Thomas, he was aware that Widnes had power to run omnibuses on the Whiston Road, named in this Bill as one of their routes, but they had never done anything up to the present but talk about it. Under the present scheme St. Helens would provide six omnibuses, but that did not mean no subsequent increase.

EVIDENCE OF MR. J. B. HAMILTON.

Mr. J. B. Hamilton, general manager of Leeds Corporation Tramways, adviser to the St. Helens Corporation on this Bill, produced statistics as to population of areas, probable cost of services, and probable revenue. He believed that the services, at the fare of 2d. per mile, would be remunerative. He had no doubt that they would be most helpful both to St. Helens and the districts concerned. He had based his calculation of cost at the highest figure, and he believed that while one route might not pay at first, the others would pay very well. The roads were now bearing traffic that was as heavy as the omnibus traffic would be, and he could not assent to the suggestion that it would require an outlay of £40,000 to render the roads suitable for the traffic. It might be that with the exception of half a mile the roads were of water bound macadam. He had allowed nothing for road adaptation outside the borough, because he considered that item was covered by the new motor taxation. If Widnes Council would guarantee that within a reasonable time they would run their authorised service along the road proposed by St. Helens, the latter Council would be satisfied. The Bill proposed to authorise trackless trolley cars to be substituted for tramways. The proposed omnibus routes would not pay if worked by a company, but there were many instances where the extension of a Corporation system made the whole undertaking profitable. At present the tramways were rate-aided.

ADAPTATION QUESTION LEFT TO THE MINISTRY.

The committee deleted the clauses giving powers to run trackless trolley cars or omnibuses over existing tramway routes into six districts.

Counsel for the London and North Western Railway then asked for a contribution in respect of bridges over which the omnibuses would run, and counsel for the Lancashire County Council urged the committee to strike out all the specified routes outside the borough, and leave in a clause enabling the Ministry of Transport to decide any subsequent application by the Corporation to establish omnibus routes outside their own area.

An offer was made by Widnes Corporation to have omnibuses running to St. Helens within three months of the passing of this Bill.

The committee thereupon struck out the similar route proposed by St. Helens, and passed the remaining parts of the scheme with provisions inserted to give the railway company and the County Council power to apply to the Ministry of Transport in respect of any claim they might take with regard to the cost of adaptation of roads. The Corporation were given power, in going to the Ministry of Transport with transport schemes within their own area, to ask for a trackless trolley system, or for ordinary tramways.

A MUNICIPAL GARAGE.

RECOMMENDATIONS TO ILFORD URBAN COUNCIL.

At the request of Ilford Urban Council, Mr. H. Shaw, their engineer presented a report on the future control of their motor vehicles. These are run by the following departments—

Electricity Department—Two electric coal wagons, 1 Sentinel steam wagon, and 1 Swift light car.

Tramways Department—One electric tower wagon and a 2-ton van.

Health Department—Two Crossley disinfecting vans, 1 Crossley ambulance, 1 Renault ambulance, 1 Ford ambulance, 1 Thornycroft cesspool and gully emptier, 6 electric house-refuse wagons.

Works Department—One Talbot car, 3 Douglas motor cycles, 31 horses, 2 electric tipping wagons, and 1 Ford van.

General Purposes Committee—One Singer light car, 1 Merryweather "Astor" fire engine, and 1 first-aid machine.

Tramways Committee—A 2-ton van on order.

Mr. Shaw recommended that the whole of the vehicles should be garaged at the depot, and that an experienced and thoroughly intelligent supervisor be appointed to have control of the detailed working of the vehicles. The cost of such garage and equipment would be £8,000. The chief duties of the supervisor would be to have the direct care and control of all vehicles; to be responsible for ensuring that drivers notified necessary repairs and adjustments; to see that vehicles were loaded overnight and are prepared ready for the road the next morning; to check all equipment, and to keep records of daily transport work. All requisitions for carrying goods should be sent to the supervisor, who should not, as at present, load vehicles entirely upon a system of day work, but arrange as far as possible to keep the vehicles loaded on their in and out journeys.

If Ilford created a central transport system there would not be the slightest difficulty in creating and maintaining a substantial saving. There was no doubt that economy would be effected in non-overlapping by working inter-departmentally, provided the supervisor were allowed full discretion in the working of the vehicles.

An important point was an examination of the tonnage carried out under present conditions, and to estimate the increased tonnage and work which could be undertaken. It would also be necessary that the approval and acquiescence of the chiefs of the departments should be obtained with their promised loyalty before any change was effected. The Council have adopted the report.

SAFETY ZONES IN PARIS STREETS.

The Paris correspondent of the *Daily Telegraph* reports that bands of red paint, 6 ft. in width, have been laid across the roadways of the boulevards to indicate to people who wish to cross that they can do so without the risk of being knocked down by a taxi-cab or motor omnibus. Even so, they must be accompanied by policemen. If the experiment gives results anticipated, all the dangerous crossings in Paris will be painted. In the view of the Prefect of Police, accidents should not occur on or near the red bands of paint, which will be a warning to drivers of vehicles to go slowly or to pull up if necessary. If accidents happen in spite of this ground-signal, drivers will be severely punished.

THE CENSUS AND TRANSPORT.

A new feature in the census paper issued to householders is a column in which the place of work has to be entered. In a booklet issued by the Registrar-General it is stated that this feature has been rendered necessary by the problems of housing and transport. The census shows how many people live in any particular district, and this new query will supply the information where the people work. From this can consequently be worked out the daily tide of movement between people's homes and their places of work. This is manifestly vital for the purpose of supplementing the transport facilities (omnibus, tramway, or train) for the working public, besides being necessary for housing purposes.

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INSTITUTION OF AUTOMOBILE ENGINEERS.

The Institution of Automobile Engineers had a busy evening on March 2, commencing with an extraordinary general meeting at which the alterations to the articles of association to conform to the conditions of the financial grant from the S.M.M.T. were carried. This was followed by the annual general meeting, when the annual report was passed, and then came the ordinary meeting, at which Dr. Hatfield gave a valuable lecture on the results of some experiments on fatigue tests on automobile steels. The author took a basis for his tests that the specimen should fail at about 10 million revolutions, the load required to produce this result giving a fair measure of comparison between different steels. Though very valuable results have been obtained, the experiments are far from complete. Final results may not be expected for some time in view of the fact that each test occupies five days and nights continuously.

No time is being lost in extending the programme of work of the Institution, rendered possible by the support of the Society of Motor Manufacturers and Traders, and on April 27 an important paper on "Ball Bearings," by Mr. H. L. Heathcote, will be read at a special meeting of the Institution at the Institution of Mechanical Engineers, Storey's Gate, St. James' Park, London, S.W.1, at 7 p.m.

Four informal meetings are to be held this year, when various accessory devices on a car are to be demonstrated and discussed, forming a valuable means of keeping the automobile engineer in touch with progress in this direction.

It is hoped to hold six additional meetings during the Commercial Vehicle and Motor Shows at Olympia, when commercial vehicles, agricultural tractors, and marine motors will be discussed.

Another useful paper will be read on April 13 by Mr. Geo. Watson, president-elect, on "A Suggested Programme for Automobile Research," which it is hoped will provide material for the Research Association of the Automobile Industry in preparing their programme.

Officers of the Institution.

At the annual meeting it was announced that Mr. Geo. Watson had been elected president for the session 1921-22, and Lt.-Col. D. J. Smith, Dr. W. R. Ormandy, Mr. Douglas Leechman, and Major B. W. Shilson had been elected vice-presidents. The following were elected to fill the 15 vacancies on the Council—Brig.-Gen. R. K. Bagnall-Wild, Messrs. A. E. Berriman, Harry Brearley, H. G. Burford, Col. R. E. Crompton, Messrs. J. H. S. Dickenson, L. H. Hounsfield, G. H. Lanchester, L. A. Legros, Max Lawrence, Lt.-Col. J. S. Napier, A. J. Rowledge, G. J. Shave, H. K. Thomas, and Major C. Wheeler.

Daimler Premium.

The premium of £25 offered by the Daimler Company for the best paper written by a graduate of the Institution was awarded to Mr. D. L. Prior for his paper on "Epicyclic Gearing in Automobile Engineering Practice." The subject has been exhaustively treated on somewhat original lines, and the paper was considered of such merit that it will be reproduced in the proceedings.

Demonstration of Devices at Birmingham.

Informal meetings in connection with the Institution will be held at Birmingham on May 5 and June 25. The first mentioned will be in the Chamber of Commerce, and will consist of an exhibition of all labour-saving devices in connection with the use of pneumatic tires, such as hdetacable wheels or rims, non-puncturable tires, air-pressure pumps, and anything that will in any way minimise trouble to the user of pneumatic tires.

On June 25 there will be an outdoor demonstration of either starting devices, carburetters, or shock absorbers fitted on cars. The object of the two demonstrations is to afford opportunities of expert criticism, with a view to eliminating possible weaknesses and securing improvements. No charge will be made, and all who are prepared to submit devices are requested to communicate with the secretary of the Institution, 28 Victoria Street, London, S.W.1.

Society of Motor Manufacturers and Traders.—The annual election of the chairmen of the various section committees has resulted as follows—Accessories and components, Mr. W. Peto; agricultural machinery, Mr. H. G. Burford; body builders, Mr. G. H. Thrupp; cars, Mr. E. M. C. Instone; commercial vehicle (petrol), Mr. F. Churchill; electric vehicle, Mr. W. Hixson; factors, Mr. A. Brown; foreign car manufacturers and concessionaires, Mr. A. S. Mays-Smith; marine, Mr. A. Perman; pneumatic tire, Mr. T. H. Woollen; solid rubber tire, Mr. A. Bonsor; steam vehicle, Mr. G. Hoare.

PLYMOUTH CORPORATION OMNIBUSES.

Ten to be Sold and Service Restricted to the Borough.

The Corporation of Plymouth on March 14 considered a proposal to dispose of ten of the twenty vehicles purchased last year. The change of policy is not due to any failure on the part of the omnibuses, but to local circumstances, the chief of which is that at the November elections the *personnel* of the Council was largely changed, and the newcomers take the view that the provision of omnibus services for areas outside the borough should be left to private enterprise. Notwithstanding that the omnibuses have only been fully in operation during the winter months, they have paid their way, and, with the extension of the services outside the borough during the summer, there was a bright prospect in view for this branch of the tramway undertaking.

Sir Thomas Baker, chairman of the Tramways Committee, said omnibuses were invaluable as feeders to the tramways and in opening up new districts, but the tramways held the field. In view of the termination of the Plymouth, Stonehouse, and Devonport Tramway Company's lease on June 30, 1922, it was not too early to make preparations for taking over that system, so that they might be ready with a complete scheme, involving the consolidation of the tramway system of the borough. As to the omnibuses, he appealed to the Council to come to a decision as to their future policy. He had been told that the roads were in a very bad condition as a result of the running of the omnibuses, but if they ceased running would there not be others in their place? Were other omnibuses likely to do less damage to the roads than the Corporation omnibuses? There were 2,276 taxed vehicles in the town, including about 500 heavy vehicles. The roads in Plymouth were not built for this kind of traffic, and could not be expected to stand the service to which they were being put. The Council had twenty omnibuses, which was more than they required inside the borough, and he saw no prospect of their going outside Under the circumstances the committee had decided that the best thing was to dispose of ten.

Mr. Churchward laid the blame on the Council, which had voted against allowing them to run outside the borough. Private interests, he said, had been too strong.

Mr. Woollcombe repudiated an attack that had been made on a Council official. He also repudiated the suggestion that any members had an interest in forming a private syndicate.

The recommendations of the committee were confirmed, Sir Thomas Baker remarking that during five operating months the omnibuses had carried 1,303,434 passengers.

STANDARD BENZOL.

Benzol for motor fuel has been standardised by the British Engineering Standards Association. According to the specification, benzol is essentially a mixture of benzene and not more than 30 per cent. of toluene and xylenes, free from undissolved water and other visible impurities, and "water white" when compared with distilled water. Its density will, at 60 deg. F., range between ·870 and ·885. Distillation of 100 cc. in the standard apparatus at 7 cc. per minute will give not less than 60 cc. at or below 90 deg. C., 75 cc. at 100 deg. C., and 90 cc. at 120 deg. C., the flask being dry at a temperature not exceeding 125 deg. C. Non-volatile residue from 200 cc. after evaporation and heating to 100 deg. C. for two hours shall not exceed ·01 per cent. by weight. The liquid is not to give more than a light brown colour when 90 cc. are shaken with 10 cc. of 90 per cent. sulphuric acid (free from nitric acid) for five minutes at ordinary temperature. Sulphur content is limited to ·4 per cent. by weight—the convenient method of testing being described. Acidity and alkalinity, determined by shaking with water a few drops of methyl orange, are to be absent, as also is sulphuretted hydrogen, the presence of which is readily indicated by shaking with water and a few drops of lead acetate solution, while the freezing point is not to be higher than 14 deg. C., the temperature being taken as that at which crystals previously frozen disappear with stirring.

Unofficial Motor Exhibition.—For fourteen days at the beginning of April, an exhibition of second-hand motor cars, cycles and industrial vehicles was held at the Crystal Palace. The vehicles, which were for sale, were stated to have been certified by experts as fit for running.

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BIRMINGHAM'S ELECTRIC VANS.

ADVANTAGES SECURED IN REFUSE COLLECTION.

A report presented by Mr. J. Jackson, the superintendent of the salvage department, to a meeting of the salvage committee on March 16, stated that thirty-two electric vehicles were now employed, but a very large proportion of the refuse collection is still carried out by horsed vehicles. The cost of collection of horsed vehicles under the continuous system is 10s. 6d. per ton as compared with 12s. under the old system.

In addition to this saving, there is the additional advantage of regularity and frequency of collection. The average working interval between each visit during the past six months was 6·49 days with electric vehicles and 6·46 with horse wagons. The average number of houses visited per week by one electric vehicle and four men was 2,116, against 1,692 with two horse wagons and four men. Electric vehicles therefore visited per man employed 25·06 per cent. more houses than horse wagons. The average weight of refuse collected per house per visit was 0·3628 cwt. by electric vehicle, and 0·4982 cwt. by horse wagons. Each electric vehicle working in the outer portion of the Montague Street area, and travelling double the mileage of the horse wagons per day, visited as many houses per week as approximately 2½ horse wagons visited in their restricted area near the depot.

The cost per house per visit was as follows—Horse wagons, continuous system, inner area, 3·22d. per house per week; electric vehicles, continuous system, outer area, 2·94d.; showing a saving in favour of the electric vehicle of 0·28d., or £125 per annum for each electric vehicle. The saving was actually much greater than this, because if the horses had to travel to the areas now served by electric vehicles they would not visit nearly as many houses as they did in the inner area, and he estimated the saving effected by transferring two horses from the long distance work into the inner areas, or short distance work, effected a further saving of at least £125 per annum, so that each electric vehicle directly and indirectly resulted in a reduction of the working costs of not less than £250 per annum.

There were distinct spheres of operations for both the horse and the electric transport, and a reduction of costs could best be obtained by utilising both methods. The working costs for electric vehicles worked out at £4 4s. 5·7d. and £4 6s. 7·2d. per day worked, according to the make of lorry employed. The cost per ton carried varied from 13s. 8·17d. to 14s. 0·81d. During the coming financial year a generating set is to be installed at the Rotton Park Street depot.

The great results achieved in installing one of the best collection systems in this country, which in many of the districts would not have been practicable with horse haulage, combined with a considerable reduction in working costs, would, Mr. Jackson hoped, permit of a great increase in the use of electric vehicles when the financial position of the Corporation is easier.

MUNICIPAL MOTOR TAXATION.

REVISED LICENSING FEES.

Recently Lambeth Borough Council took out licences for three motor sweeping machines and two vacuum gulley cleansers at a cost of £123. They have since received a communication from the London County Council stating that it has been decided that the tax on vehicles, such as motor sweeping machines and gulley cleansers, should be paid at the rate of £1 per horse-power unit or portion thereof. The revised charges will be £14 each for two Laffley motor sweeping machines, £12 for a Lacre sweeping machine, and £33 each for the two gulley cleansers. Hence the Council will secure a refund of £17.

In connection with the Council's motor disinfecting van a licence was taken out at £21, but the Ministry of Transport have since decided that the tax on this class of vehicle should be at the rate of £1 per horse-power—a total of £16—and in these circumstances there will be a refund of £5.

TRACTORS NOT EXEMPT.

The Minister of Transport, in answer to Dundee district committee's request that tractors used in the reapir of roads should not be taxed, says that each class of vehicle to be exempted had been considered by a Departmental Committee, and in these circumstances he does not propose to introduce legislation to exempt vehicles of the class referred to.

ANTI MUD-SPLASHING DEVICES.

A competition promoted by Camberwell Borough Council to determine the most efficient anti-mud splashing device for motor vehicles was held on March 14 at Denmark Hill, and was attended by about 40 competitors from various parts of the British Isles and the Continent, including representatives from Paris and Copenhagen. An artificial mud-patch was used, through which the drivers steered their vehicles, the effectiveness or otherwise of the various mud-screens being recorded on a whitewashed board. Great diversity of construction was apparent in the screens, the materials used including iron plates, rubber, brush-work, and chains. There were 11 different tests, and it is noteworthy that 20 per cent. of the entrants obtained more than half the aggregate possible marks—475.

The devices used by the following entrants were allotted more than 50 per cent. of the possible marks. The competitors are given in order of merit—Gadgets, Limited, 34 International Exchange, Birmingham; The Gentleman Anti-Splash Company, 29 Red Lion Square, London; The Gentleman Anti-Splash Company; J. M. Strachan, 14 Leonard Place, High Street, Kensington, W.; Sherrington Anti-Splash Guard Company, Limited, 16 Arcade Street, Ipswich; The Gentleman Anti-Splash Company; F. Menu, Cie, Générale des Pare-Boue, 37 Rue Pasquier, Paris; Sherrington Anti-Splash Guard Company, Limited, 16 Arcade Street, Ipswich.

AN IRISH MUD SPLASHING BY-LAW.

At Glasgow Corporation Magistrates' Committee a letter was submitted from the chief constable with regard to complaints made as to damage caused to persons and property in the city by the splashing of mud and water, caused by the wheels of heavy motor vehicles, and also a letter received by him on the subject matter from the Commissioner of Police, Belfast, stating that, in terms of the Order, of date May 13, 1919, made by the Local Government Board for Ireland, every such vehicle in Ireland is required to be "fitted with a device so constructed and fixed and of such a character as will prevent mud or water being thrown by such heavy motor car upon any person or property or upon any other vehicle." The committee, after consideration, agreed that the matter be continued pending the town clerk communicating with the Secretary for Scotland thereon.

T. TILLING'S SERVICES.

INTEREST ACQUIRED IN PROVINCIAL UNDERTAKINGS.

At the 24th annual meeting of Thomas Tilling, Limited, held on March 22, at 20 Victoria Street, S.W., the chairman (Mr. R. S. Tilling) stated that the net profits, after providing for interest on the first debentures, were approximately £110,000. They brought in from the previous year a little over £62,000, which gave a total of over £172,000. Out of this total interest on the income debenture stock and the dividend on the preference shares had to be provided, and they proposed to allocate £50,000 to special reserve, which would increase the reserve to over £105,000. After declaring a dividend of 10 per cent. on the ordinary shares, there was a balance to carry forward to next year of £59,263—subject to any liability for excess profits duty and Corporation profits tax. The assets now amounted to over £1,250,000, without any item of goodwill. The times had been exceedingly difficult, but since the alteration in fares the London omnibus traffic had again become remunerative. It was now about eight years since by the help of additional capital and undivided profits they were able to motorise the remaining and major part of their omnibus business, and with the amount thus available they built a fleet of over 200 omnibuses working in their own name besides a number of other descriptions of motor vehicles.

The board had acquired a substantial interest in a number of large omnibus undertakings in the provinces, on whose boards they were represented, and had acquired the business of the Brighton, Hove, and Preston United Omnibus Company. They had a substantial interest in Tilling-Stevens Motors, of Maidstone, had acquired a large freehold garage at Croydon, and purchased the freeholds of several of their business premises. The net result had been that they had been able to transform and modernise this business and place it in the forefront of road transport undertakings both in London and the provinces, and pay substantial dividends all the time. They were rebuilding their fleet of London omnibuses as well as a considerable proportion of those at Brighton. The directors thought that they would be able to produce a fair result despite the present period of depression, given normal conditions.

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OMNIBUS SERVICES.

STOKE-ON-TRENT.—The Watch Committee have issued licences to a company to run omnibuses in connection with a service to Hanley.

GLASGOW CORPORATION are recommended by the Tramways Committee to include in the next Parliamentary Bill a clause giving powers to run omnibuses.

PRESTON.—The Tramways Committee have received a report from the engineer on a proposal to establish an omnibus service to Plungington, but the committee decided to take no action at the present time.

MANCHESTER.—The watch committee have had applications from Leyland Motors, Limited, and the Salford Corporation for licences for motor vehicles to ply for hire in Manchester. Consideration was adjourned.

BIRMINGHAM AND MIDLAND COMPANY.—This summer the Birmingham and Midland Omnibus Company are running coach trips from various centres. The season opened at Easter with trips from Worcester and Droitwich.

SWANSEA.—The Watch Committee have refused to grant an application made by Messrs. T. White and Company, of Barry, to run an omnibus service from Swansea to Mumbles, the vehicles being of a double-deck type.

MACCLESFIELD.—The British Automobile Traction Company have augmented their services in the district, and have opened up a circular route embracing Stockport and Buxton, which is likely to prove popular for both business and pleasure traffic.

LONDON.—The London General Omnibus Company expect, by the end of April, to have replaced all the older single-deck omnibuses by a larger type, which will seat 26 passengers. Already there are 18 of these new vehicles in operation on the Woolwich Tunnel route and for private hire.

WOLVERHAMPTON.—The Tramways Committee have decided to purchase four omnibuses (chassis by Tilling-Stevens Motors, Limited, and bodies by Christopher Dodson, Limited) at a cost of £1,692 each. Another omnibus will be purchased if the Corporation are successful in negotiations for a service to Bridgnorth.

EASTBOURNE.—The town clerk of Eastbourne (Mr. H. W. Fovargue), who opened a discussion on "Municipal Trading" at the local Y.M.C.A., pointed out that Eastbourne was the first Corporation to get power to run motor omnibuses, and added that the service had more than paid for its share of the wear and tear of the roads.

PLYMOUTH-YEALMPTON.—The Great Western Railway Company have been granted a licence by Plymouth Corporation for an omnibus service between the borough and Yealmpton. The places are connected by railway, but over the route of eight miles privately owned omnibuses have for some time done a good business with passengers and goods.

BIRKENHEAD-WALLASEY.—A joint omnibus service run by the Birkenhead and Wallasey Corporation tramway departments was started on March 19 between Birkenhead and Seacombe Ferry. The through fare is 5d., and a forty minutes' service is given. The service which has been running for some time from Rock Ferry pier to Woodhey has been extended to Port Sunlight.

CARDIFF.—The Tramways Committee are considering an application made by a deputation representing 250 residents in the Penylan district for a service of motor omnibuses. In reply to the chairman of the committee, one of the deputation said he thought the residents would not object to paying a penny or three-halfpenny rate for the service. The Chairman.—If we put omnibuses in that neighbourhood we shall probably have to run them in other districts, and it will mean that we will have to go to the Corporation and ask to spend something between £30,000 or £50,000.

DUNDEE.—The Corporation are applying to the Secretary for Scotland for a provisional order which will include powers to run omnibuses by animal, electrical, or any other mechanical power within and beyond the burgh, such omnibuses to be part of the tramways undertaking. If unopposed the order will cost between £300 and £400. At a meeting of a sub-committee of the Council on March 29, Councillor Johnson asked whether it was worth while relaying tracks, as the possibility of using omnibuses would arise in time. He favoured their use on certain routes. It was decided to instruct the general manager (Mr. W. P. Young) to report on the desirability of substituting omnibuses.

MOTOR VEHICLES FOR MUNICIPALITIES.

GILLINGHAM COUNCIL are borrowing £2,500 for the purchase of electric vehicles.

YORK COUNCIL are getting a loan of £1,470 for the purchase of a motor fire engine.

CHESTER COUNCIL have decided to purchase a motor fire engine at a cost of £1,650.

KENDALL CORPORATION Streets Committee have a "Sentinel" steam wagon on order.

KEIGHLEY TRAMWAYS COMMITTEE propose to purchase a 40-50 cwt. petrol tower wagon.

ILFORD COUNCIL propose the erection of a garage for electric vehicles at a cost of £1,257.

GOSPORT URBAN COUNCIL have obtained permission to borrow £1,800 for the purchase of a fire engine.

CARNARVON TOWN COUNCIL Works Committee recommend the purchase of a one-ton motor at a cost of £308.

WESTMINSTER CITY COUNCIL entered 18 wagons in the annual parade organised by the Commercial Motor Users' Association.

DENTON URBAN COUNCIL have obtained permission to borrow £385 for the purchase of a motor fire tender, and £640 for an ambulance.

ISLINGTON BOROUGH COUNCIL have received sanction from the Ministry of Health to obtain a loan for the purchase of eleven electric vehicles.

PERTH.—The Town Council is seeking power to borrow £20,000 for the purchase of further motor omnibuses and for general tramway purposes.

BRIDLINGTON TOWN COUNCIL have empowered the borough engineer to purchase a steam wagon and trailer at a cost not exceeding £1,500.

ILFORD COUNCIL have asked the transport committee to consider and report upon the question of the hire of taxi-cabs for the use of the several departments.

THE TRANSPORT SUB-COMMITTEE of Mansfield Corporation suggest the purchase of a car for the use of officials and workmen at the pumping stations.

ST. ANDREW'S COUNCIL have taken delivery of a motor fire engine supplied by the Leyland Motors, Limited. The vehicle travelled to its destination by road.

ILKESTON GAS COMMITTEE have adjourned the question of the purchase of a lorry pending the decision of the Corporation as to the use of motors for house refuse collection.

SOUTHWARK BOROUGH COUNCIL have been advised by the works committee to purchase two Atkinson steam wagons for gulley emptying and street watering, at a cost of £3,000.

GLASGOW PARKS COMMITTEE have purchased a 2-ton standard Leyland chassis, model A lorry, at £1,048, similar to one recently supplied. The price is a reduction of £200 on the first vehicle.

EAST HAM HEALTH COMMITTEE, in view of the satisfactory manner in which the house refuse has been collected by electric vehicles, recommend the purchase of three more electric vans.

ST. HELENS.—The Bill promoted by the Corporation seeking powers to run a motor omnibus service has been passed, in modified form, by the Local Legislation Committee of the House of Commons.

SYDNEY MUNICIPAL COUNCIL, N.S.W., propose to purchase an "Auto" sweeper at a cost of £1,385, and an "Elgin" sweeper at a cost of £2,665, a total of £4,050, or, with the American exchange added, of about £5,779.

WOLVERHAMPTON CORPORATION TRAMWAYS COMMITTEE have decided to purchase four motor omnibuses (chassis by Tilling-Stevens Motors, Limited, and bodies by Christopher Dodson, Limited) at a cost of £1,692 each.

BATH CORPORATION have received a report from a special committee recommending the purchase from the General Vehicle Company of four 2-ton electric vehicles for refuse collection and one 2-ton wagon for general haulage, at a total cost of £7,170.

LINCOLN.—The seven omnibuses recently acquired by the tramways department did a good business in conveying visitors to the races, a special fare being charged. So great was the throng that vehicles from other places had to be licensed during the race week.

PORTSMOUTH.—The Tramways Committee have instituted an omnibus service from Cosham to the top of Portsdown on Wednesday, Saturday and Sunday afternoons and on public holidays, in order to relieve the congestion at the Cosham terminus of the Horndean Light Railway Company.

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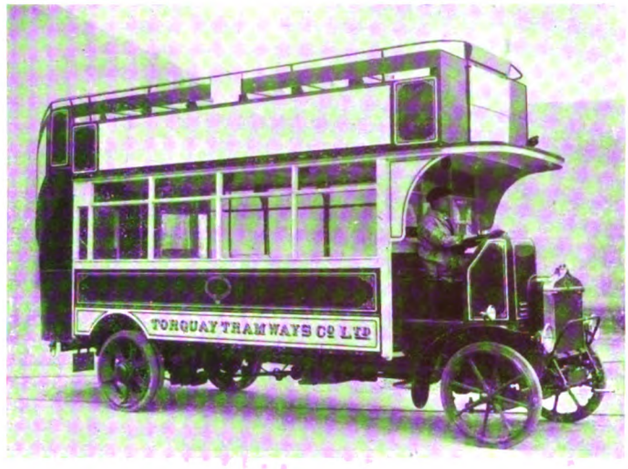
MOTOR TRAFFIC

GREENWICH BOROUGH COUNCIL Health Committee recommend the purchase of a motor disinfecting van at a cost of about £535. Having had a week's trial of a secondhand Allchin steam wagon, the works committee recommend its purchase from the North Metropolitan Electric Power Supply Company at £490.

CAMBERWELL BOROUGH COUNCIL have allotted £5,000 for the purchase of motor vehicles. According to a report of the surveyor, £1,700 is for a Leyland steam wagon and gulley emptier (less 5 per cent.). He also states that in consequence of improved paving, the displacement of horsed vehicles by motors, fewer vehicles are now required for road cleaning.



A "K" Omnibus Constructed for Torquay Tramways Co. by the A.E.C. Co.

FARM TRACTOR FOR HULL.—At Hull Corporation Asylums Committee it was reported that the city engineer and the farm bailiff had inspected various types of motor tractors, and were of opinion that the "International Junior" was the most suitable type for the committee's requirements. The price was £380. The committee left the matter in the hands of the chairman, the engineer, and the bailiff.

LONDON COUNTY COUNCIL have sanctioned the borrowing of £57,110 by Islington Borough Council for the provision of eleven mechanically-propelled vehicles for street maintenance and watering, including charging plant and garages. At the end of March, 1,000 of the K type 46-seat omnibuses had been put in service. Good progress is being made in introducing the new S 54-seat vehicle, twenty now being on the road.

ECONOMY LESSON FROM IPSWICH.—An interesting comparison between the cost of horse and electric transport vehicles for house refuse collection was made by Mr. E. V. Harrison, Ipswich Borough, Surveyor, at a Ministry of Health inquiry into the Council's application to purchase two additional electric vehicles for this purpose. The cost of collection by horse transport he gave as 18s. 3d. per ton, and that by electric vehicles, 11s. 4d. per ton, resulting in a saving on the tonnage collected, of £1,500. The 2-ton electric vehicle, with driver and three collectors, did the work of four horses, carts and drivers, and the 3½-ton electric did that of five. The results of the two, therefore, equalled those which were achieved by nine horses, carts and men.

LIGHTER MOTORS FOR WESTMINSTER.

The Highways Committee of Westminster City Council recommend the purchase of six 2-3 ton 22-24 H.P. chassis from the Daimler Company. The proposal to get these light wagons was made by reason of a report of the city cleansing superintendent, who said the present type of motor was too cumbersome and unwieldy. His report also showed that motor haulage is 33⅓ per cent. cheaper than horse haulage. The committee received prices for light vehicles from 17 firms. The price of the Daimler chassis recommended for purchase is £675 each, and the Company say the price not long ago was £1,050. The Council will obtain bodies estimated to cost £200 each.

MOTOR COACH SEASON.

LANCASHIRE TRAMWAYS COMPANY'S ARRANGEMENTS.

A publication that will raise pleasurable anticipations and be of service to the organisers of outings in Lancashire is the 1921 season booklet of the coach touring department of the Lancashire United Tramways, Limited, Atherton. It is issued by Mr. E. H. Edwardes, the general manager, at 1s. 6d., and comprises 80 pages, many of which contain descriptions and illustrations of tours undertaken by the company. These journeys include Wales and a seven days' visit to Cornwall and Devonshire. Visits can be paid to any district if sufficient passengers are forthcoming. Last year there were sixty coaches in service, but that number was scarcely sufficient to cope with all demands at the busiest season. One of the company's triumphs of organisation—which recur annually—was the conveyance in June last of a party of 1,450 people from Bolton to Blackpool and back. Besides catering for long period parties, facilities are offered for the booking of single seats at various centres. On the question of fares, the company state that "petrol is higher in cost and the heavy tax and increased wages mean considerable increase in running costs, but it is hoped to run at the same rates as in 1920, with the exception of Saturdays and holidays. The midweek and Sunday rates will be lower than railway rates for the same journeys."

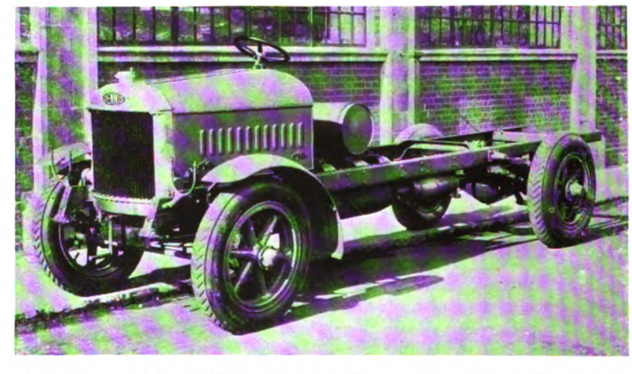
FARES FROM LONDON TO SUSSEX AND KENT.

Owners of five hundred coaches met in London on March 8 to discuss arrangements for the season, which will begin on May 13. Daily services will be run to the follo..ng places at single fares higher than those charged on the railways, as will be seen from the subjoined list—

	Coach.	Third Class Train.		Coach	Third Class Train.
Margate ...	Single 12/6 ...	... 10/9½	Deal ...	Single 12/6 ...	... 11/11½
Folkestone	,, 12/6 ...	... 10/4½	Hythe ...	,, 12/6 ...	... 9/10
Eastbourne	,, 11/- ...	... 8/4	Dover ...	,, 12/6 ...	... 11/3½
Brighton	Return 15/- ...	Return 14/8	Herne Bay	,, 12/6 ...	... 9/1
Sandwich	Single 12/6 ...	... 11/4½	Hastings	,, 11/- ...	... 8/9½

THE LAW AND TRAILER BRAKES.

The number of complexities in the fulfilment of the law which confront the owners of road transport vehicles will not be lessened by an answer given by the Minister of Transport in the House of Commons. Sir A. HOLBROOK asked whether the Minister knew that traders who had purchased two-wheeled aeroplane trailers from the Disposals Board had been prosecuted at Southampton for using these trailers under the same conditions as they were previously used by the Government Departments, the grounds of the information being not having a brake on at least two of the wheels and not having a man on the trailer to operate the brake, which did not exist; that the trailer in question was coupled to the vehicle in front by means of a rigid bar, and was therefore controlled from the driving seat of the lorry; and would he issue instructions that the use of such trailers on public roads might be permitted, on the ground that brakes cannot be affixed to them, and thus save traders loss which they must necessarily incur by scrapping the trailers if not permitted to use them?



A 2-2½-ton Dennis Chassis, with Pneumatic Tires, Designed to take a 18-20-Seated Char-a-Bancs Body.

Sir E. GEDDES replied that his attention had been drawn to the conviction at Southampton. "It is the duty of persons using vehicles upon the public highways to satisfy themselves that they comply with the law. I am advised that as the law stands the use of the trailers in question in the way indicated is illegal, and that there are no insuperable difficulties in complying with such law."

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MOTOR TRAFFIC

MOTOR TRAFFIC NOTES.

ROADSIDE FUEL STATIONS.—The Automobile Association have now eight roadside fuel stations in operation. The last to be opened is at Bolney, on the London-Brighton road.

NO ROAD LIGHTHOUSES.—Sir E. Geddes, replying to Mr. E. Harmsworth, said it was not the intention of the Ministry of Transport to erect road lighthouses at dangerous corners.

COMMER CAR DEMONSTRATION.—From April 4 to April 18 there is a demonstration of commercial and industrial cars by the Commer Car Company at Tailby and Tyler's garage, Charlotte Street, Birmingham.

ELECTRIC AND HORSE VEHICLE COSTS.—The borough surveyor of Mansfield has reported that during January the cost of collection by the electric vehicle was 12s. 8d. per ton as against 12s. 6d. per ton by horsed-vehicles.

ROAD PETROL PUMPS.—Owing to the obstruction to traffic which would be created by the installation of pumps on the road-side for bulk supply of petrol, the Institution of Municipal and County Engineers has informed its members that such innovations are not desirable.

MOTOR TAXATION.—In the House of Commons on March 21, Sir E. Geddes, replying to Lieut.-Colonel Hilder, said he was not aware that a great amount of irritation was caused to motorists by the way in which the motor-car tax was levied. The new scheme was working smoothly.

ROAD TRANSPORT BY RAILWAY COMPANIES.—The County Councils' Association applied to the Ministry of Transport for permission to be represented on the Committee which has been set up to consider the question of road transport by railway companies, but the request has been refused.

DURHAM ROAD BILL OPPOSED.—Thirty petitions have been lodged against the Bill promoted by the Durham County Council, and there will be keen opposition. Powers are sought in the Bill to construct 57 miles of overhead trolley wire for railless vehicle routes and about 32 miles of tramways.

SCOTLAND AND THE C.M.U.A.—Area committees in connection with the Commercial Motor Users' Association have been formed for the Edinburgh, Glasgow, and Dundee Districts. One of the members of the Edinburgh Committee is Mr. W. J. Thomson, the managing director of the Scottish Motor Traction Company.

BLACKPOOL COACH STATION.—The coach station at Blackpool was opened for the Easter traffic. It is situated at Marshall Street, and comprises every convenience for passengers, while accommodation is provided for 120 coaches and cars. There is also a repair shop. For local private cars permanent garage facilities are available.

SAURER COMMERCIAL VEHICLE COMPANY.—Mr. R. E. Wilson has resigned the position of assistant sales manager to Messrs. J. and E. Hall, Limited, of Dartford, having been appointed sales manager of the Saurer Commercial Vehicle Company, 64, Mortimer Street, W. These Swiss vehicles attracted general attention at the Olympia Exhibition last year.

DUNLOP TIRES CHEAPER.—The Dunlop Rubber Company, Limited, have effected a reduction of approximately 20 per cent. in the cost of Dunlop covers and of 15 per cent. on Dunlop tubes. In the case of 815 by 105 "magnum" cover, for example, the price drops from £10 4s. 3d. to £8 3s. 6d., and a tube of similar dimensions from 30s. 9d. to 26s. 3d.

PETROL FOR USE IN NATIONAL EMERGENCY.—The Government have repaid to oil companies £320,000 motor spirit duty on bulk stocks withdrawn from bond and maintained in depots at the request of the Government for use in case of emergency. The repeal of the duty from the commencement of the present year was responsible for the repayment.

TRANS-CONTINENTAL HIGHWAY FOR CANADA.—A highway has been mapped out to connect Montreal and Vancouver. The value of a national motor highway across Canada to the Dominion, as well as to tourists, can be well appreciated from the fact that in 1919 the registration of cars totalled nearly 400,000, showing 67,000 new owners, and the number is expected this year to reach half a million.

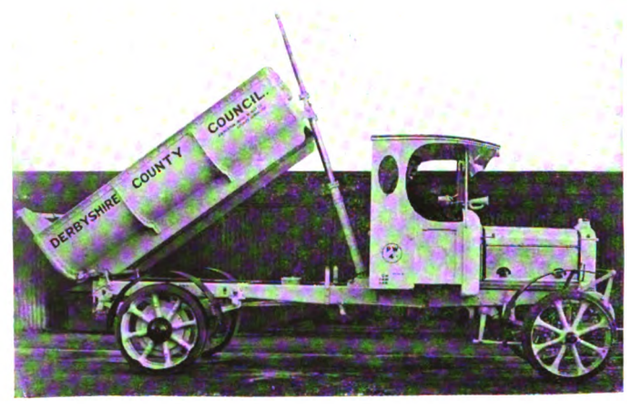
MANCHESTER COMMITTEE OF ROAD USERS.—For the purpose of opposing before the Parliamentary Committee the clause in the Manchester Corporation Bill, requiring all vehicles to come to a stop when passengers are entering or leaving a tramway car, the Manchester Committee of Road Users has been formed. The president is Mr. J. Nal, M.P., the chairman Mr. R. C. Reynolds, and the secretary Mr. H. Robinson.

WESTMINSTER FAVOURS PASSENGER QUEUES.—The Westminster City Council have agreed to the principle of the formation of queues at omnibus and tramway-car stopping places. It was suggested that queues should be allowed in Trafalfar Square, and the Council agreed as an experiment that the word "queue" should be added to the present "stop" signs, both there and in Victoria Street, near the Brighton and South-Eastern railway termini.

A HACKNEY CARRIAGE POINT.—The Home Office notifies local authorities that in the case of a motor hackney carriage which is licensed by the local authority to ply for hire, the one payment of the appropriate exise duty will in future cover also the payment to the local authority for the licence to ply for hire. The Ministry of Transport, which receives all the duty so paid, will recoup the local authority for the loss of revenue consequent on this change.

NO COMMERCIAL EXHIBITION FOR DUBLIN.—Complaint has been made by the Royal Dublin Agricultural Society of the action of the Society of Motor Manufacturers and Traders in refusing to permit their members to exhibit at the Show at Ballsbridge. The Secretary of the Society suggested that, pending the establishment of an annual show in Ireland, the London organisation should continue to grant the privilege hitherto given to agents in Ireland.

C.A.V. ENTERPRISE.—Messrs. C. A. Vandervell, Limited, are organising a scheme to provide a chain of service depots throughout the United Kingdom, which will enable the motorist in any kind of difficulty with his battery equipment to be always within hail of a C.A.V. station. This is a piece of enterprise which will be welcomed by British motorists. Stations already established are



Derbyshire County Council's A.E.C. Tipping Wagon.

at Dublin, Belfast, Cardiff, Birmingham, Coventry, Sheffield, Leicester, St. Albans, and Bedford.

WAR OFFICE LORRY SUBSIDY SCHEME.—Sir L. Worthington-Evans, asked by Sir H. Brittain, in the House of Commons on March 22, whether any decision had been reached to substitute for the proposed subsidy a system of registration of motor lorries the services of which might be required by the Government, replied—The subsidy scheme has been postponed for the present (applause), and the question as to what steps should be taken in the matter during the current year is under consideration.

SPEED GOVERNORS.—The Highways Committee of West Riding County Council report that they have again had their attention called to the damage which is occasioned to roads by the excessive speed at which heavy motor lorries travel, and recommend that it be imperative for all users of County roads by steam or motor wagons or chars-a-bancs of over one ton load capacity to instal on such vehicles governors to be effective at 12 miles an hour, and that the Ministry of Transport be informed accordingly.

SLOUGH'S ORDER FOR 1,000 LORRIES.—It is reported that under an agreement entered into between M. Krassin, on behalf of the Russian Soviet Government, and the Slough Trading Company, 1,000 lorries will be sold to the Soviet. The lorries have been reconstructed and rebuilt for service in Russia. The agreement will come into force as soon as the trade agreement with Russia is signed. This contract, by clearing war surplus lorries, should assist the motor trade in this country again to assume the normal.

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MOTOR TRAFFIC

Replacement of Lost Licences.—The Royal Automobile Club, having taken up with the Ministry of Transport the question of the replacement of a car licence that may be lost as a result of theft or accident, has received a communication to the effect that the regulations under the Roads Act, 1920, will provide for replacement of licences which have been lost, destroyed, or accidentally defaced. This statement by the Ministry should not be confused with the recent ruling affecting a case in which the licence is stolen with the car.

Theft of American Motor Vehicles.—The French under-secretary for the Liquidation of War Stocks announced on March 30 that the French Government had bought from America the contents of the American camps in France for $400,000,000 at the rate of exchange of seven francs to the dollar, payable in two years, but the capital is to bear interest at the current rate of exchange of the dollar, which is at present fourteen francs. Referring to the thefts which had been committed in these camps, M. Paissant said that some 1,500 automobiles had already been stolen.

Roadside Telephones at Night.—As a result of experiments conducted for some months, the Automobile Association have further developed the system of sentry boxes along the main roads for day and night service. The first of the roadside telephone boxes to be illuminated on the principle selected as a result of these tests is situated on the Epsom road, near Ashstead. The Association have decided to illuminate in like fashion the telephone signs attached to all A.A. roadside boxes to the number of over 50 along the main roads. Access to the boxes can be gained by members.

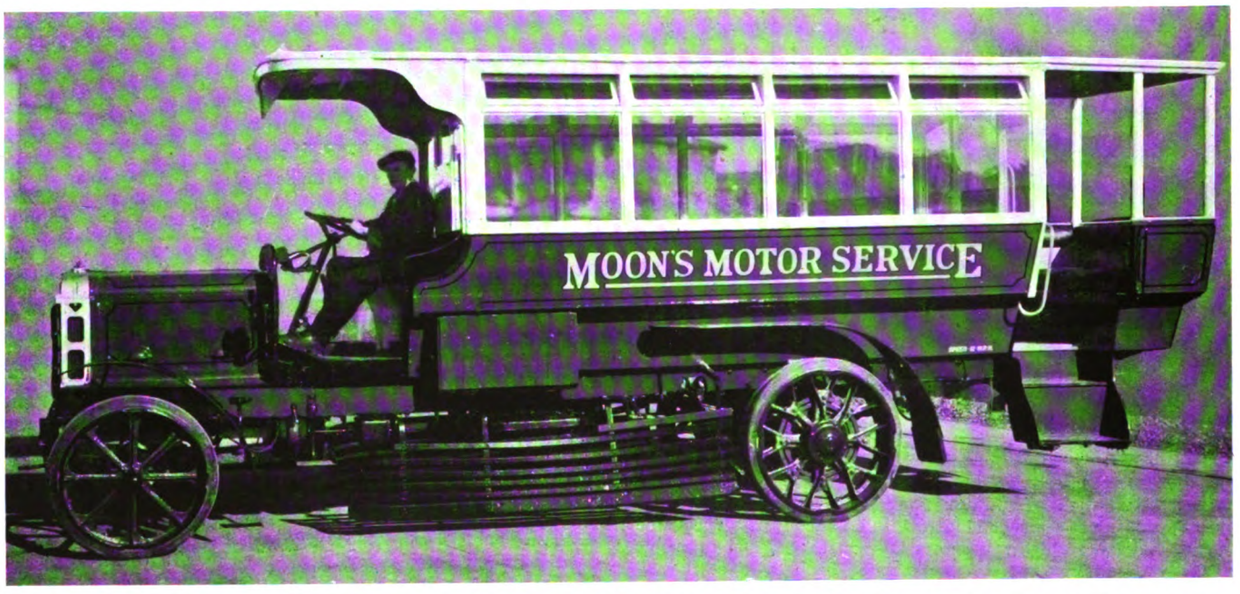
A Motor Tax Refund Account.—At South Shields Licensing Committee the Town Clerk reported that the owner of a private car having an engine manufactured before January 1, 1913, was entitled to a refund of 25 per cent. on duty paid thereon on proving to the satisfaction of the Corporation that the engine was constructed before that date. Owing to the number of applications submitted to the Ministry of Transport, delay is taking place in making repayments, and the Ministry suggest that the Corporation should open an account and make repayments direct to applicants. The committee decided to open a "motor tax refund account" accordingly.

Three-Wheel Motors for London Police.—The Commissioner of Police for the Metropolis has been a long time in realising that constables mounted on horses are not only useless for the control of a traffic that is now over 90 per cent. motor, but are a danger to the public. It is to be hoped, however, that there is no truth in a statement recently published that constables riding motor cycles with sidecar are to "patrol the 700 square miles of the police area," in order to "regulate motor traffic." While a few such machines can be usefully employed, there is no need to unnecessarily add to the burden of the police rate, against which numerous Councils have protested.

White Gloves for Traffic Regulation.—London's new Commissioner of Police is to be congratulated upon having adopted a method of traffic control that has long been found of utility in the provinces. Constables engaged in point duty at busy crossings are experimenting with white gloves, which certainly make the upraised hand more conspicuous, especially at night. By the way, it is time that writers in London newspapers learnt that there is nothing wonderful in a London constable bringing traffic to a standstill by raising his hand. The practice obtains in many provincial towns. If a driver fails to comply he can be called upon to appear before the magistrates.

"Leyland" Rivalry with the Railway.

Excessive Centralisation in Road Repair.—Referring to a movement in the West Riding of Yorkshire urging the County Council to revert to the old arrangement of local oversight, as an endeavour to lower the heavy cost of road maintenance, Alderman R. Garnett, a member of the Highways Committee, has stated that the Council had acted unwisely in taking over the roads when they were in a bad state of repair. The burden thrown on to the staff at the County Hall was greater than it was humanly possible to accomplish, with the result that there had been more or less chaos throughout the Riding ever since. It had been found impossible to control efficiently the thousand miles of main roads from Wakefield, and it was now proposed that the Highways Committee should be divided into a number of sub-committees, each responsible for a portion.



Ex-L.G.O.C. "B" Chassis Converted to Single-Deck Working. The Vehicle Seats 24, and is Running at Abergavenny.

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THE Tramway & Railway World
WITH MOTOR TRAFFIC SECTION

Founded 1892. LONDON, MAY 19, 1921. VOL. XLIX.

ELECTRIFICATION OF THE HERSHEY CUBAN RAILWAY.

CONVERSION AND EXTENSION OF A THIRTY-FIVE MILE STEAM LINE.

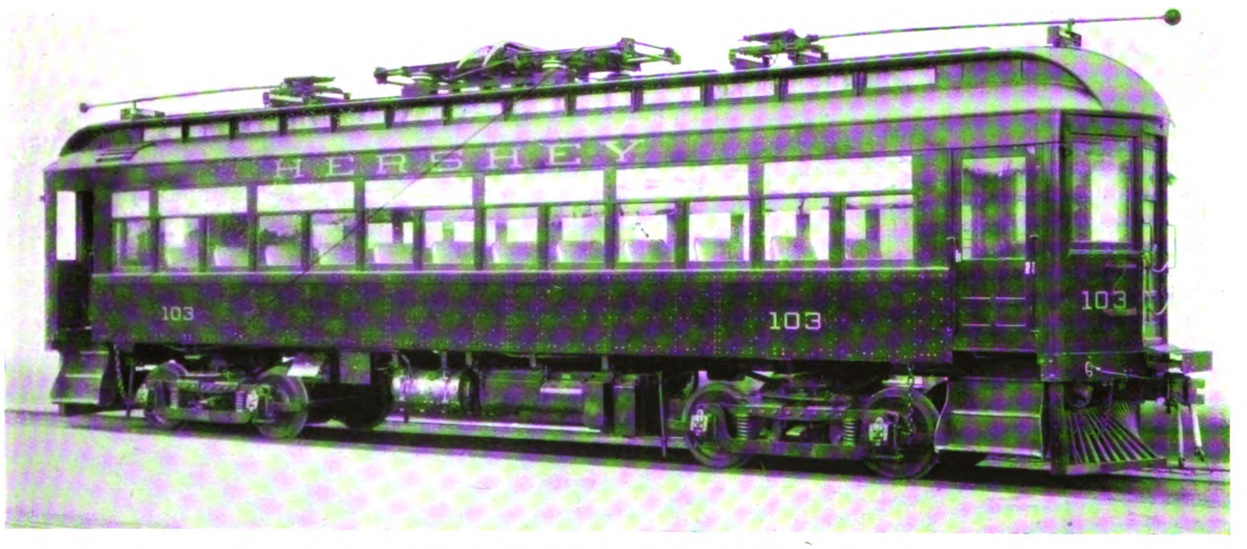
The car of which illustrations are here given is one of ten closed motor passenger cars constructed by the J. G. Brill Company, Philadelphia, U.S.A., for the Compania Ferrocarril Cubano de Hershey, Cuba. Central Hershey, where the vast plantation of the well-known Hershey chocolate and cocoa interests is located, is situated in Havana Province, midway between Havana and Matanzas on the north coast of Cuba. For several years the surrounding district has been served by the Hershey Cuban Railway Company, a 35-mile steam line which is now in the process of electrification and extension.

With the completion of the electrification of this line it is intended to maintain service between Havana and Matanzas, a distance of 56 miles, for the transportation of sugar, local freight and express, as well as a multiple-unit train service on an hourly headway schedule. Including all spurs, sidings, and extensions this railway will consist of some 80 miles of track.

The passenger cars illustrated are 37 ft. 4 in. in length and constructed with steel underframes, consisting of side sills, 4 in. by 4 in. by $\frac{5}{16}$ in. angles the full length of the body, to which is securely fastened $\frac{3}{32}$ in. steel side sheath extending from the underside of the side sill angle to the belt rail. The centre stringers consist of two 6 in. 10½ pound channels which extend from buffer to buffer. Crossings are of 4 in. 5¼ pound channels, which are securely gussetted to the side sill angles and the channel centre stringers. The upper structure is principally of wood with body and vestibule posts of oak, ash and yellow pine being used for the other members.

The closed vestibule on each end is constructed with two windows and a swing type train door. The windows have double sashes, the top sash being stationary and the lower one arranged to drop. Suitable sash racks are included to permit holding the drop vestibule sash at any desired distance. The upper half of the swing train door is fitted with double sashes, the top one of which is stationary and the lower arranged to drop. On each side of the platform there is also a swing door over a Brill hinged trapdoor which is folded up against the end of the car body when this door is opened. There are triple steps on each side of the platform. The height from the rail to the top of the first step is 14 in., and each of the other steps are 12 in. high. All vestibule sashes and door channels are of mahogany, and present a pleasing appearance. The top sashes in the side windows are stationary, and extend across the space of two lower sashes, which are arranged to raise. The upper side sash and ventilator sash are glazed with green opalescent glass and add greatly to the appearance of the cars.

The roof is of the monitor deck type, extending over



Electric Motor Car for Hershey Railway.

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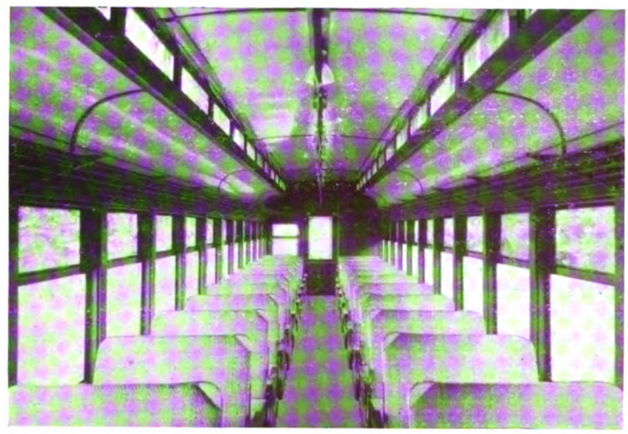
the hoods. The roof boards are of 2 in. poplar, and after being given a thick coat of paint, screw and nail holes being puttied, is covered with No. 8 canvas.

As will be noted in the illustration, in addition to the two trolley poles and bases, a pantograph type of trolley is also mounted on the roof; and in order that the roof may properly support this equipment it is strengthened with concealed steel rafters so placed that they relieve the strain of the trolley equipment.

Inside the car body the floor is of the "chanarched"



Interior of Electric Car—Hershey Railway.

type, filled in with flexolith painted in red to conform to the appearance of the inside finish. Below the belt rail on each side the car is sheathed with agasote. The ceilings are also of agasote. Mahogany is used for the inside finish, and is very plain, conforming to what is known as "sanitary finish." A continuous iron basket rack is placed above the windows on each side of the car for the storage of miscellaneous packages which the passengers may have. The seats, which are upholstered in Brill twill-woven rattan, are of the Brill reversible back type, including pressed steel pedestals, wall and aisle plates. The aisle plate is capped with mahogany arm rests. In each of the four corners of the car body there is a small longitudinal seat. In one corner of the car there is a saloon, which is entered through a door with both upper and lower panels of wood. At diagonal corners on each platform a motorman's cab is partitioned off, with suitable entrance and exit.

The trucks are of standard gauge, and of the Brill patented No. 27-MCB-2X type, with 6 ft. wheel base and 6 ft. 3 in. side frame centres. This truck is constructed according to the well-known solid forged side frame practice of the builders, and is equipped with 4¼ in. by 8 in. journals of the MCB type. On each end of the car in front of the trucks it will be noted there is a wooden pilot reinforced with steel, according to American railway steam practice.

There have also been constructed at the Brill works several other types of car equipment for this electrified Cuban Railway, including one works' motor car, three 37 ft. 4 in. combination passenger and baggage motor cars, and two 49 ft. 3 in. combination baggage and postal motor cars, all of which have also been mounted on the Brill high-speed type of truck, No. 27-MCB-2X.

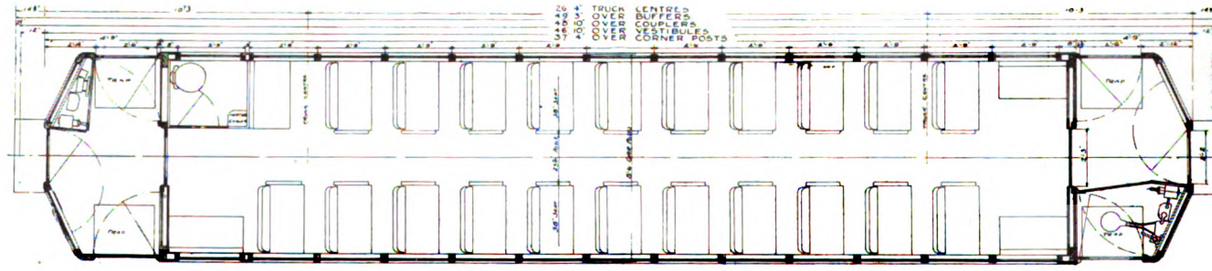
It is interesting to note that shipment of these cars was made on their own wheels from the Brill works at Philadelphia over the Cuban all-rail route *via* Key West, Florida.

UNDERGROUND RAILWAY SCHOOL.

How New Employees are Taught.

The need for efficient and smart working on the part of the staff of the London Underground Railways to enable them to cope with the heavy traffic to which these lines are subject has been met by the establishment of a training school at North Lambeth Station, on the Bakerloo line. That the classes held at this centre—which was instituted in February last year—admirably fulfil their purpose was evident to the gathering of technical press representatives who were recently privileged to inspect the premises. The school, which superseded a less ambitious effort on somewhat similar lines at West Brompton, was created for the purpose of centralising the engagement of all new employees for the traffic departments of the different Underground Railways, and to facilitate their training by demonstration equipment. Recruits for the staff are taken on probation for a week, and if found suitable and medically fit are retained. The accommodation at the school includes an office, lecture room, booking office school, motor equipment room, kinema hall, and medical officer's room.

As the preliminary grades are those of booking clerks and porters, instruction is first given in these duties, coupled with illustrated lectures on the general lay-out or "geography" of the lines, the rules laid down for avoiding accidents, and particularly on the need for thorough and consistent courtesy. It is impressed upon new men that they must regard themselves essentially as public servants.



Plan of Electric Motor Car—Hershey Railway.

The system, however, goes much further than preliminary training. After a period of service in the lower grades, men are eligible for promotion to gatemen, collectors, liftmen, guards, signalmen, and motormen, but before their status is raised they must return to the school for special instruction. This includes lectures, practical demonstration on mechanical models, and the display of kinema films. The instruction is imparted in the company's time, and before the men "pass out" they are examined and must receive a certificate. It is understood that a large proportion of the men are anxious to qualify for the

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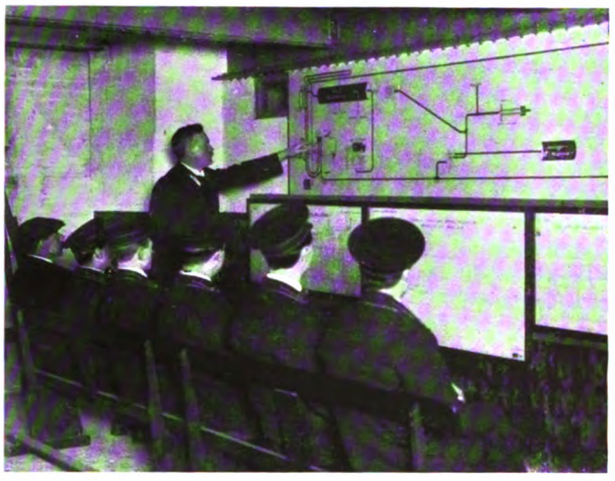
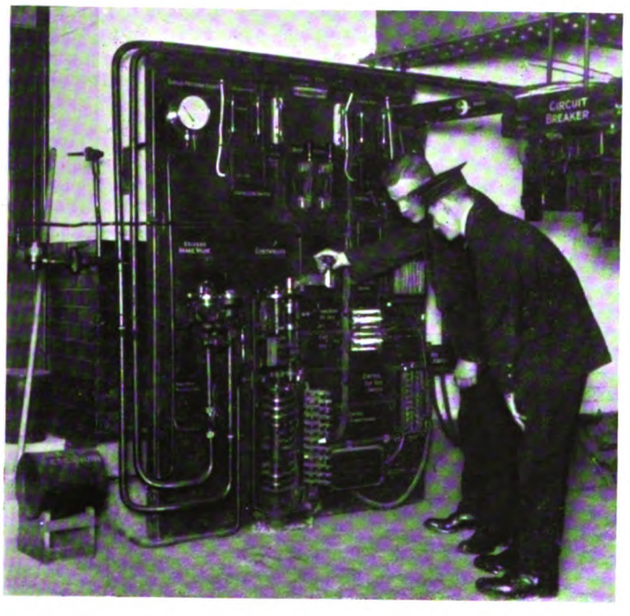
better posts, especially that of motormen, in which—as an official knowingly put it—" they don't have to deal with the public." The percentage of failures to gain proficiency certificates is low. The school instruction is supplemented by practical tuition on the line under a capable instructor.



Instructor Explaining Brake Diagram.

Apart from the qualifying classes above described, all grades are encouraged to attend voluntary classes held twice weekly for the improvement of their general knowledge of matters affecting the work of the railways. At the end of three months' service each new employee is reported upon by his stationmaster and the district inspector. To ensure physical efficiency all prospective employees are examined by the companies' medical officer, and before they can subsequently pass to a higher grade they must again be certified.



Control Apparatus and Switchboard at Underground School.

The lecture-room is well equipped with desks, a blackboard, various diagrams on the walls, and cases containing representative selections of the different kinds of passengers' tickets issued on the respective companies' lines.

The motor equipment room, of which we reproduce two photographs, is fitted out on very practical lines, calculated to afford the future train driver a clear insight into the mechanism he will control. One side of the room is occupied by the standard equipment of a District Railway control car. There is a complete switchboard, connected up with the various units of the power and brake equipment, so arranged as to permit of easy access and study by the learner. The operation of the control levers on the switchboard are indicated by the appearance of corresponding electric lights. The wall of the opposite side of the room is occupied by several very clear diagrams explanatory of the brakes and lighting equipment, a noteworthy feature being a large painted diagram of the complete Westinghouse brake installation. On a table in the centre of the room sectional parts are displayed for demonstration purposes, and form a useful accompaniment to the study of the standard text-books. Lessons in the control of lifts are given on those in the adjoining station.

The school, which is believed to be the only one of its kind in London connected with railways, is directed by Mr. E. Yorke, inspector of employment and training, who, with Mr. J. Thornton (superintendent of the line), explained the methods to the visitors.

During the school's first year (February 1920 to February 1921) 257 new staff were engaged, whilst 433 men of various grades passed through for instruction. Medical examinations numbering 320 were made in respect of new staff and promotions to higher grades.

WHITLEY COUNCIL FOR RAILWAYS.

The agreement signed by the railway companies and the three great railway trade unions, that, upon decontrol, Joint Councils of officials and employees shall be formed to deal with administrative and labour questions, on the principles of the Whitley Report, marks another milestone on the path that leads from force to reason as the prime factor in the settlement and avoidance of industrial disputes.

This step is another triumph for the " Whitley principle " in industry, and the Industrial League and Council rightly regards this wise decision by the railway unions and management as at least an indirect result of its efforts to create a spirit of co-operation and conciliation in industrial administration.

The Industrial League and Council has some justification in making this claim from the fact that officials and members of the constituent railway unions have actively and personally assisted in its propaganda, and fill positions on its Executive Councils, Mr. G. J. Wardle, C.H. (late editor of *Railway Review* and member of National Union of Railwaymen), being one of its vice-presidents, Mr. G. Latham (assistant secretary, Railway Clerks' Association), its honorary secretary, and Mr. A. Bellamy (ex-president, National Union of Railwaymen) is a trustee and member of its central executive committee. All these gentlemen have worked hard and enthusiastically in propagating the work of Whitleyism.

It may not be generally known that until his recent elevation to the rank of the first Commoner in the land the Right Hon. J. H. Whitley was one of the joint presidents of the Industrial League and Council, and actively interested himself in its work in popularising the principles embodied in the report of the now famous Whitley Committee.

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STANDARDISATION OF TRAMWAY ACCOUNTS.

REVISED LIST OF EXPENDITURE ACCOUNTS RECOMMENDED AT A CONFERENCE IN LEEDS.

We give below the report of a conference of tramway accountants representing several important undertakings, which was held at Leeds in December last, and the recommendations then made—and since adopted by the undertakings represented—with a view to putting their respective accounts on a comparable basis. The circumstances under which the conference was called are explained in a foreword by Mr. J. B. Hamilton, general manager of the Leeds City Tramways. As Mr. Hamilton points out, the report is of importance to tramway operators generally, and we therefore publish the text in full.

FOREWORD.

By J. B. HAMILTON, C.B.E.

(General Manager, Leeds City Tramways.)

The Standard Form of Tramway Accounts which was agreed upon in 1904 by a joint committee of members of the Institute of Municipal Treasurers and Accountants and the Municipal Tramways Association, has since been adopted by practically all municipal tramway undertakings in the country, and also by some of the companies operating tramway concerns. The object of formulating a Standard Form of Accounts was that of rendering comparisons between the accounts of different undertakings possible, and doubtless this object has been attained within certain limits, with useful results.

Owing to the lapse of time since the Standardisation of Accounts, however, and the differing interpretations which have been placed upon the directions originally given in connection with the Standard Form relative to the nature of expenditure to be charged to the various accounts, differences in allocation have been introduced which has had the effect of detracting somewhat from the value of the comparisons made. These defects were brought to light when a detailed comparison of their respective expenditure accounts was made by the general managers of the Leeds, Manchester, Sheffield, and of the London group of company-owned tramways, in November, 1920.

We then realised that if true comparisons between the various accounts were to be made which would be worthy of confidence, it was essential that those who were responsible for the keeping and compilation of the accounts of the undertakings mentioned should meet together and, after ascertaining the principal differences which existed between them, should endeavour to reconcile the same. We therefore directed our several accountants and other assistants to meet in Leeds in December last, when the above-named object was fully and unanimously attained, the benefits from which will be felt hereafter by comparisons being rendered more safe and reliable, and thus conducing to economies in administration and operation.

In addition to harmonising differences in methods of allocation, it will be observed during a perusal of the following report that alterations and some additions have been made to the Standard Form, without, however, fundamentally changing the same. Moreover, Lists of Accounts have been agreed upon relative to motor omnibus operation and railless trolley systems.

We believe that the report will be of interest to tramway operators and accountants generally, and therefore publish the same, hoping that the fullest use will be made of it throughout the country.

THE REPORT.

By J. W. BLAKEBOROUGH,

Accountant, Leeds City Tramways, and Chairman of the Conference.

To the General Managers of the Leeds City Tramways, Sheffield Corporation Tramways and Motors, Manchester Corporation Tramways, and the London Group of Tramways:—

In accordance with the arrangements made by you, your representatives met in conference at the Leeds City Tramways offices on December 13, 14 and 15, 1920. Those present were Messrs. J. W. Blakeborough, J. S. Hamilton, jun., Somerville, and Moxon (Leeds); Roberts, Frank, and Hewitt (London); F. A. Mitcheson (Manchester); Olivant and Alton (Sheffield).

Perhaps it would not be out of place to allude to the meeting which was held at Leeds between Mr. Hamilton, Mr. Fearnley, and Mr. Spencer on November 10. At this meeting comparisons were made between the expenditure accounts of your several Undertakings, and it was discovered that although each was following the standard form of accounts, divergencies existed in the allocation of similar expenses in a large number of cases. It was then decided that it was necessary for these differences in allocation to be harmonised, and that the several accountants and assistants should meet in conference. Upon an examination being made of the respective lists of detailed accounts kept by each undertaking, a tabulated statement was drawn up, and it was ascertained that these differences numbered at least 50, involving considerable amounts of expenditure, and largely vitiating the value of any comparisons between particular accounts affected. The duty you placed upon your representatives was to find ways and means of reconciling these differences, so that in future years comparison might safely be made between the accounts of the various undertakings, with the knowledge that similar expenditure was included under the various headings given in the accounts in each case; and where this reconciliation involved alterations or additions in the accounts, to make recommendations thereon for your consideration.

Your representatives endeavoured to approach the numerous questions which came before them for discussion with an open mind, keeping in view the need of arriving at a unanimous agreement. Every item that required adjustment was carefully considered and discussed in the light of its relative importance. According to your directions, your representatives kept clearly in view the undesirability of recommending any fundamental alteration in the accounts as set out in the standard form. In addition to recognising that any radical change in the standard form was undesirable, it was also felt that comparisons between the various years' accounts of the individual undertakings as far as possible should not be impaired. With these stipulations in mind your representatives recommend the following changes:—

SUGGESTED ALTERATIONS IN TITLES OF ACCOUNTS.

Firstly, that in *three* cases alterations should be made in the titles of accounts, in order somewhat to extend their scope. The first of these alterations is the account hitherto known as "fuel, light and water for depots" under traffic expenses. It is suggested that this account shall be known as "heating, lighting and cleaning of depots." It will be observed that the object of the alteration is to extend the scope of the account in order to include cleaning of depots expenditure.

The second alteration recommended is that the account described as "uniforms and badges" should be known as "uniforms and personal equipment." This account will then include all expenditure on uniforms, badges, cash bags, shoulder straps, punch holders, etc.

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The third alteration is connected with the account under general expenses, "fuel, light and water for offices." It is considered that the scope of this account should be much more comprehensive, and should be made to include not only fuel, light and water, but, in addition, wages of cleaners, cleaning materials, wages of lift attendants and porters, uniforms of same, repairs and renewals of office furniture and equipment, inspection of lifts, etc. The suggested new title is "upkeep of offices." The setting up of this alteration will provide in one item the expense involved in the maintenance of the offices; further, it will have the satisfactory effect of reducing to a considerable extent the amount of expenditure included under the heading of "general expenses (miscellaneous)."

SUGGESTED ADDITIONAL ACCOUNTS.

Secondly, that five additional accounts be introduced, having the effect of clearing up ambiguity in the standard form, and providing further analysis in cases where this is required, whilst comparisons with previous years' accounts will still be possible. The titles of these suggested additional accounts are—

No. 1.—Salaries of Time-table, Traffic, and Cash Clerks.—This additional account would be included under the heading of traffic expenses, and would follow the account "superintendence." No definitive provision appears to have been made in the standard form for expenditure of this nature, and it appears that different accounts have been charged with this expenditure in the case of three undertakings represented.

No. 2.—Traffic Equipment on Routes.—This account would appear under the heading of "traffic expenses," and would come immediately before "miscellaneous." The opening of this new account would achieve the result of reducing the amount of expenditure included under the heading of "traffic miscellaneous." Such account would include all expenditure on stopping-place brackets, traffic signs, time recorders, etc.

No. 3. Employers' Liability Insurance and Compensation.—According to the standard form, account No. 17 (accident insurance and compensation) should include the annual premium on both third party and employers' liability policies, or, if the claims are settled by the department, the amount of claims paid and the legal expenses connected therewith. It is now proposed that this account (No. 17) should be taken as being inclusive merely of the third party risks expenditure, or amount of annual premium in respect thereof, and that a new account should be set up to be known as "employers' liability insurance and compensation." If this recommendation is adopted, than a ready comparison in respect of each separate account is rendered available.

No. 4. Health and Unemployment Insurances.—The incidence of this charge has fallen upon employers in the interim since the inauguration of the standard form of accounts, and the necessity for the inclusion of this account is obvious.

No. 5. Telephones, Telegrams and Postages.—In the past these items have appeared mainly under the heading of "general expenses (miscellaneous)." It is suggested that this account should immediately precede "general expenses (miscellaneous)," and that all expenditure on telephones (including rental of Government telephones), trunk calls, and repairs to privately owned telephone installations should be charged therein.

The introduction of the alterations and additions described above was one of the principal means whereby it became possible for your representatives to achieve unanimous agreement on each of the fifty differences in allocation with thich they had to deal, with the solitary exception of one item, viz, excess mileage, which may be adjusted after the London officers have received further instructions. The list of 50 differences previously referred to, which was drawn up in the first instance and circulated, will be found attached to this report, with an addendum giving seriatim the names of the accounts agreed upon for future allocation, in the form of resolutions passed.

CAR MAINTENANCE—SUBSIDIARY ACCOUNTS.

In addition to reconciling differences in allocation, the question of grouping the subsidiary costs accounts kept under the heading of "cars" was considered, and it was found that in the case of Leeds, London, and Sheffield a common grouping of the existing subsidiary accounts was practicable, and would render possible comparisons between the "car maintenance costs" of these three undertakings in detail, without further changes. The grouped accounts referred to, and according to which comparisons may be obtained, are as follows—

CAR MAINTENANCE.

Electrical Equipment.

(1) Trolleys.
(2) Controllers and power circuit.
(3) Motors.
(4) Lighting of cars, including destination lights.
(5) Electric brake.
(6) Car meters.
(7) Salaries of superintendent, foremen, and depot clerks (proportion).

Mechanical Equipment

(8) Hand brakes.
(9) Lifeguards.
(10) Gears, cases, and pinions.
(11) Trucks.
(12) Sand gear and gongs.
(13) Wheels, axles, axle-boxes and bearings.
(14) Salaries of Superintendent, foremen, and depot clerks (proportion).

RAILLESS CARS AND MOTOR OMNIBUSES.

Lists of accounts were agreed upon in respect of each of these auxiliary services. The standard form of accounts was adhered to as far as possible, with the necessary omissions or additions required in consequence of the differing systems of transport as compared with ordinary tramways. These lists are attached hereto.

RECOMMENDATIONS OF THE CONFERENCE.

The following resolutions represent the recommendations now made by the conference of accountants, etc., to the end of placing the accounts of the several undertakings on a comparable basis.

N.B.—The numbered items are those appearing on a list of principal differences in allocation of expenditure in the accounts of the several undertakings represented, which was drawn up prior to the conference.

No. 1, Cash Clerks. No. 2, Time-table Staff. No. 3, Traffic Clerks.—It is recommended that a new account be opened to be designated "salaries of time-table, traffic and cash clerks." This account should be charged with the salaries of the staff engaged in compilation of time-tables and similar work; also with the salaries of clerks in the traffic superintendent's office, assisting with the reports, records, etc., together with clerks engaged in taking cash from the conductors or preparing same for payment to bank. Salaries of pay clerks will appear under the heading of "salaries of general officers and staff. (Arising out of this, the question of the account "superintendence" was discussed, and it was agreed that this account should embrace only the salaries of the superintendent and his principal assistants.).

No. 4. Instructor, Training School.—This expense should be charged to "wages of other traffic employees' account."

No. 5. Inspectors.—Where inspectors are solely engaged in the regulation of traffic, the "other traffic employees" account should be charged with the amount of their wages. That in cases where ticket inspectors are solely engaged in inspection of tickets, this expense should be charged to "ticket check account." That where ticket inspectors, however, are engaged partly in the inspection of tickets and partly in the regulation of traffic, then this expense should be charged in respect of the approximate proportion of time engaged on ticket inspection to "ticket check account," and in respect of the approximate portion of time engaged in the regulation of traffic to "wages of other traffic employees account." In the case of motor inspectors' wages, proportions should be charged to "wages of other traffic employees account" and "repairs and maintenance of cars account" respectively, one-half to each.

No. 6. Depot Foremen.—The wages of foremen in charge of depots should be allocated to "cleaning and oiling of cars account," and to "Car (Maintenance) Account," in proportions to be determined by the relative number of men supervised, engaged in the respective duties of cleaning and oiling of cars, and repairing of cars.

No. 7. Learners.—Under the heading of "wages of motormen and conductors" a subsidiary account should be kept, to be charged with the amount of payments to motormen, and conductors in respect of gratuities paid for teaching learners.

No. 8. Accidents Inspector.—The salaries of accident inspectors should be charged to "accident insurance and compensation account."

No. 9. Compensation.—It is a recommendation that an additional account shall be included in the annual published accounts and the monthly or other statements, to be designated "employers' liability and compensation," this to fall next in order to the "accident insurance and compensation account," and to include under this heading the all-in cost of insurance or settlement of claims under the Employers' Liability Acts.

No. 10. Gatemen.—This expense should be chargeable to "wages of other traffic employees account."

No. 11. Changing Boards and Shunting.—This expense should be chargeable to "wages of other traffic employees account."

No. 12. Social Club Attendants.—The wages of social club attendants, where defrayed by the undertaking, should be chargeable to "general expenses (miscellaneous) account," together with cost of uniforms.

No. 13. Car Cleaning.—The wages of foremen in charge of depots should be allocated to "car cleaning account" and to "car (maintenance) account," in proportions to be determined by the relative

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number of men supervised, engaged in the respective duties of cleaning and oiling of cars and repairing of cars.

No. 14. Fitting Up Bamboo Canes.—This expenditure should be charged to "car maintenance (trolleys) sub-account."

No. 15. Breakdowns on Track.—Where possible this expenditure should be charged to the person legally responsible. In other cases, to "traffic expenses (miscellaneous)."

No. 16, Mess-room Attendants (at Night Depots). No. 18, Cleaning Depot Offices and Sheds. No. 19, Heating and Lighting of Depots.—An alteration should be made in the account hitherto known as "fuel, light and water for depots." It is recommended that this account should be designated as "heating, lighting and cleaning of depots." To this revised account should be charged the expenditure referred to under these headings; therefore to this account should be charged wages of arc lamp trimmers or other attendants in connection with lighting, all lighting accessories, also gas, electricity, etc., the wages of labourers employed in cleaning the depots, attending on mess-rooms or the boiler-house, firing, etc.; water used for cleaning the depot, team labour in connection with the removal of refuse, etc.

It was further resolved that the total cost of lighting, heating and cleaning of depots should be divided between the account of that name in "traffic expenses" and "car (maintenance) account." The proportions to each should be determined by the relative number, of men engaged on the work of car repairs and car cleaning respectively.

No. 17. Gate Attendants.—This expense should be charged to "traffic expenses (miscellaneous)."

No. 20. Lighting and Heating of Car Works.—The whole of this expenditure should be charged to "car repairs" account as an on cost.

No. 21. Printing Way Bills.—All printing, stationery, and advertising should be charged to "printing, stationery, and advertising account" in the "general expenses." It is desirable, however, that separate subsidiary accounts be kept, analysing the expenditure under a few main headings.

No. 22, Ticket Holders. No. 23, Cash Bags.—It is recommended that the account hitherto described as "uniforms and badges" under "traffic expenses" shall be altered to "uniforms and personal equipment account." This account will then include all expenditure on uniforms, badges, cash bags, shoulder straps, punch holders, etc.

No. 24. Conveyance of Superintendent.—This item should be charged to "general expenses (miscellaneous) account."

No. 25. Wages Attending to Termini Lights.—This expense should be charged to "electrical equipment of line."

No. 26. Excess Mileage.—In view of the fact that this is of minor importance in the case of Manchester and Sheffield, it was resolved that this item shall be left in abeyance pending London receiving further instructions thereon.

No. 27. Printing, Stationery, etc.—(See resolution in connection with No. 21, printing way bills.)

No. 28. Welfare Superintendent.—This expense should be charged to "general officers and staff account."

No. 29, Hall Porters and Night Watchmen. No. 31, Cleaning Offices, Materials. No. 35, Repairs to Office Lighting. No. 38, Repairs to Office Furniture. No. 40, Inspection of Lifts. No. 47, Charwomen, Head Office.—It is recommended that the account under "general expenses" known as "fuel, light and water for offices" be altered, and that it shall be known as "upkeep of offices." In addition to "fuel, light and water, and boiler attendants' wages," this account will include wages of cleaners, cleaning materials, wages of lift attendants, and porters, uniforms of same, inspection of lifts, repairs and renewals of office furniture and equipment.

No. 30. Stores Checkers.—This expenditure should be charged to "general expenses (salaries of general officers and staff)."

No. 32. Stores Superintendent and Staff.—In the case of Manchester and London, owing to the superintendent being engaged exclusively in the stores, "stores expenses" is the account chargeable with this expenditure. In the case of Sheffield, one-half of the superintendent's salary is chargeable to each of the following accounts, "salaries of general officers and staff" and "stores expenses." In the case of Leeds the whole of the stores superintendent and purchaser's salary is charged to "salaries of general officers and staff."

No. 33, Telephones and Repairs. No. 39, Stamps and Postages. No. 42, Line Telephones.—It is recommended that a new account be opened under the heading of "general expenses" immediately to precede "miscellaneous," and that all expenditure on telephones be charged therein, together with cost of telegrams and postages. Repairs to privately owned installations will be included under this heading, and the account shall be designated "telephones, telegrams, and postages."

No. 34. Newspapers, Periodicals, etc.—The cost of newspapers, periodicals, trade journals, etc., required for general purposes, shall be charged to "general expenses (printing, stationery, etc.)."

No. 36. Health and Unemployment Insurance.—It is recommended that an additional account be set up, to be known as "health and unemployment insurances." These expenses shall be charged to this account.

No. 37. Carriage.—Where practicable carriage should be charged against the particular account to which the goods carried are ultimately charged. In other cases to "general expenses (miscellaneous) account."

No. 41. Motor Cars Used by Tramway Department.—All expenditure connected with motor cars, excepting initial cost or renewals of same, shall be charged to "general expenses (miscellaneous) account." An exception to this rule is to be made in cases where cars are used solely in a particular sub-department such as permanent way.

No. 43. D.C. Mains.—This charge be included in the "power expenses account."

No. 44. Cars.—In the case of Leeds, Sheffield, and London the various subsidiary accounts kept by the respective undertakings should be grouped, where necessary, with the view of arriving at constituent accounts common to each, in order to enable exact comparisons to be made, and that the list of accounts attached hereto be recommended for adoption for this purpose.

No. 45. Travelling Expenses and Disbursements.—These expenses should be charged to "general expenses (miscellaneous) account."

No. 46. Ambulance Fees and Accessories.—These items should be charged to "general expenses (miscellaneous) account."

No. 48. Fidelity Insurance.—This item should be charged to "fire and other insurances account."

No. 49. Motor Tower Wagons and Horse Derricks.—All expenditure in respect of the upkeep of motor tower wagons and horse derricks should be included under the heading of "electrical equipment of line," and separate subsidiary accounts should be kept in respect of same.

No. 50. Repairs to Sand Dryer.—The cost of the repair and maintenance of sand dryers should be charged to "cleaning, salting, and sanding track," and that a separate subsidiary account be kept in respect of same.

A vote of thanks was passed to Mr. J. B. Hamilton for the way in which representatives were received, and also to the chairman in respect of his duties during the three days' discussions.

Revised List of Expenditure Accounts,

Including Alterations and Additions Recommended and now Adopted by the Tramways Undertakings of Leeds, Manchester, Sheffield, and the London Company-owned Group of Tramways Undertakings.

Traffic Expenses—

1. —Superintendence.
(*a*) 2. —Salaries of Timetable, Traffic and Cash Clerks.
3. —Wages of Motormen and Conductors.
4. —Wages of other Traffic Employees.
5. —Cleaning and Oiling Cars.
6. —Cleaning, Salting and Sanding Track.
(*b*) 7. —Heating, Lighting and Cleaning of Depots (formerly "Fuel, Light and Water for Depots").
8. —Ticket Check, including Wages of Inspectors and Clerks.
(*b*) 9. —Uniforms and Personal Equipment (formerly "Uniforms and Badges").
(*a*) 10. —Traffic Equipment on Routes.
11. —Miscellaneous.

General Expenses—

12. —Salaries of General Officers and Staff.
13. —Store Expenses.
14. —Rents.
15. —Rates.
16. —Printing, Stationery and Advertising.
(*b*) 17. —Upkeep of Offices (formerly "Fuel, Light and Water for Offices").
18. —Accident Insurance and Compensation.
(*a*) 19. —Employers' Liability Insurance and Compensation.
20. —Health and Unemployment Insurances.
21. —Fire and other Insurances.
(*a*) 22. Telephones, Telegrams and Postages.
23. —Miscellaneous.

General Repairs and Maintenance—

24. —Permanent Way.
25. —Electrical Equipment of Line.
26. —Buildings and Fixtures.
27. —Workshop Tools and Sundry Plant.
28. —Cars.
29. —Other Rolling Stock.
30. —Power Expenses.

(*a*) Additional Account; (*b*) Altered Account.

Suggested Headings for Standard Form of Accounts in Connection with Operation of Railless Cars.

Traffic Expenses—

1. —Superintendence and Salaries of Traffic Office Staff.
2. —Wages of Drivers and Conductors.
3. —Wages of other Traffic Employees.
4. —Cleaning and Oiling Railless Cars.
5. —Heating, Lighting and Cleaning Depots.
6. —Ticket Check.
7. —Uniforms and Personal Equipment.
8. —Licenses (old style).
9. —Miscellaneous.

General Expenses—

10. —Salaries of General Officers and Staff.
11. —Store Expenses.
12. —Rent and Rates.
13. —Taxes on Railless Cars (new style).
14. —Printing, Stationery and Advertising.
15. —Upkeep of Offices.
16. —Accident Insurance and Compensation.
17. —*Insurances*, including Fire, Employers' Liability, Health and Unemployment, etc.
18. —Miscellaneous.

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Repairs and Maintenance—
19.—*Railless Cars*—
Chassis.
Tires.
Bodies (Repairs and Painting).
20.—Buildings and Fixtures.
21.—Workshop Tools and Sundry Plant.
22.—Miscellaneous.
23.—*Road Maintenance.*
24.—*Power Expenses.*

RAILLESS CAR MAINTENANCE.—SUBSIDIARY (OR COST) ACCOUNTS.

1.—*Chassis*—
(*a*) *Electrical Equipment*—
Power and Light Circuit.
Controllers and Resistances.
Motors.
Trolleys.
Skates.
Sundries.
Foremen's Wages.
Tools (on Cost).
(*b*) *Mechanical Equipment*—
Trucks.
Gears.
Wheels.
Brakes and Steering Gear.
Bearings.
Sundries.
Foremen's Wages.
Tools (on Cost).
2.—*Tires.*
3.—*Bodies*—
Repairs, Painting.

SUGGESTED HEADINGS FOR STANDARD FORM OF ACCOUNTS IN CONNECTION WITH OPERATION OF MOTOR OMNIBUSES.

Traffic Expenses—
1.—Superintendence and Salaries of Traffic Office Staff.
2.—Wages of Drivers and Conductors.
3.—Wages of other Traffic Employees.
4.—Cleaning and Oiling Omnibuses.
5.—Heating, Lighting and Cleaning Depots.
6.—Ticket Check.
7.—Uniforms and Personal Equipment.
8.—Licenses (old style).
9.—Miscellaneous.

General Expenses—
10.—Salaries of General Officers and Staff.
11.—Store Expenses.
12.—Rents and Rates.
13.—Taxes on Omnibuses (new style).
14.—Printing, Stationery and Advertising.
15.—Upkeep of Offices.
16.—Accident Insurance and Compensation.
17.—*Insurances*, including Fire, Employers' Liability, Health and Unemployment, etc.
18.—Miscellaneous.

Repairs and Maintenance—
19.—*Omnibuses*—
Chassis.
Tires.
Bodies (Repairs and Painting).
20.—Buildings and Fixtures.
21.—Workshop Tools and Sundry Plant.
22.—Miscellaneous.
23.—*Road Maintenance.*
24.—*Power Expenses*—
Motor Spirit.

MOTOR OMNIBUSES' MAINTENANCE.
SUBSIDIARY (OR COST) ACCOUNTS.

1.—*Chassis*
- Chassis (including Wheels, Axles, Brakes, etc.).
- Engines (including Ignition).
- Gears and Clutch.
- Dynamo and Motor.
- Lighting.
- Hand Tools (on Cost)
- Foremen's Wages, etc. (including garage charge as on cost *pro rata* to wages).

2.—Tires.
3.—Bodies.

CAR MAINTENANCE—GROUPINGS OF EXISTING SUBSIDIARY ACCOUNTS.

TITLE OF COMPOSITE ACCOUNT FOR COMPARISON PURPOSES.	TITLES OF EXISTING ACCOUNTS IN RESPECTIVE UNDERTAKINGS.		
	LEEDS.	SHEFFIELD.	LONDON GROUP.
ELECTRICAL EQUIPMENT—			
1.—Trolleys	Trolleys	Trolley Standards, Heads, and Wheels	(*a*) Trolleys (*b*) Leakage Indicators
2.—Controllers and Power Circuit	(*a*) Controllers (*b*) Resistances (*c*) Power Circuit, Lightning Arrestors, Canopy and Earth Switches	(*a*) Controllers (*b*) Motor Switches and Motor Fuses (*c*) Lightning Arrestors (*d*) Choke Coils (*e*) Resistances (*f*) Repairs to Trunk Cables	(*a*) Controllers (*b*) Resistances (*c*) Power Cables
3.—Motors	(*a*) Motor Cases and Pole Pieces (*b*) Field Coils (*c*) Armatures (*d*) Commutators (*e*) Overhauling Motors (*f*) Re-lining Bearings (*g*) Examining Motors (*h*) Brushes, Yokes, etc.	(*a*) Armatures (*b*) Field Coils and Leads (*c*) Armature Bearings (*d*) Brush Yokes	(*a*) Armatures and Brush Gear (*b*) Field Coils (*c*) Motor Cases
4.—Lighting of Cars, including Destination Lights	Light Circuits and Head Lamps	Lighting	Lights
5.—Electric Brake	Electro-mechanical Brake		Magnetic Brake
6.—Car Meters		Car Meters	Car Meters
7.—Salaries of Superintendent, Foremen, and Depot Clerks (proportion)	Foremen's Wages, etc.	Foremen's Wages (Supervision)	Rolling Stock Superintendent, Foremen, and Clerks
MECHANICAL EQUIPMENT—			
8.—Hand Brakes	Hand Brakes	Hand and Slipper Brakes	Hand Brakes
9.—Life-guards	Life-guards	Life-guards	Life-guards
10.—Gears, Cases, and Pinions	Gears, Cases, and Pinions	Gears and Pinions	Gears and Pinions, and Gear Cases
11.—Trucks	Trucks and Variable Gauge Trucks	Trucks	Trucks
12.—Sand Gear and Gongs	Sand Gear and Gongs	(*a*) Sand Gear (*b*) Gongs	(*a*) Sand Gear (*b*) Gongs
13.—Wheels, Axles, Axle Boxes, and Bearings	(*a*) Wheels (*b*) Axles, Axle Boxes, and Bearings	Wheels, Axles, Axle Boxes, and Bearings (New Account)	(*a*) Wheels and Axles (*b*) Bearings
14.—Salaries of Superintendent, Foremen, and Depot Clerks (Proportion)	Foremen's Wages, etc.	Foremen's Wages (Supervision)	Rolling Stock Superintendent, Foremen, and Clerks

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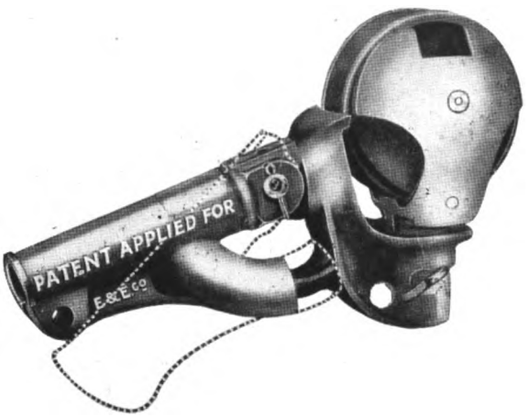
OVERHEAD LINE MAINTENANCE.

The "Springbok" Trolley Head.

Tramway managers and engineers are making special efforts in these days to reduce running costs with the object of overcoming financial difficulties, which press so heavily on the great majority of undertakings. In their efforts to this end one item that always attracts their attention is the maintenance of the overhead equipment. The fact that a gang of overhead repair men has always to be kept available in the depot is a serious matter, and managers know that in practice the gang frequently have nothing to do, although when the faults occur the interruptions generally come in batches.

Few tramways have been able to estimate accurately the maintenance cost per mile of their overhead construction. During some months the cost will be extremely low, while at others it will rise, and the maintenance cost per mile will vary largely with different systems. One of the great causes of expense in connection with this item is the frequent fracture of the trolley wire at a distance from its supports, especially at crossings and points, in spite of the almost universal adoption of flexible suspensions. Much has



"Springbok" Trolley Head.

been done to minimise the trouble, yet it frequently recurs, and it is doubtful whether anything short of catenary suspensions will result in complete success. Such a method would not be suitable for street tramways both on account of cost and appearance.

It is therefore necessary to turn to the other offending member which causes the trouble, namely, the trolley head and its supports. Here we have a fixed collector wheel running in bearings upon a swivelled trolley head, rigidly attached to a heavy steel boom diverted skywards under the action of a heavy spring. In order to keep the wheel constantly in contact with the wire the spring pressure has to be extremely heavy, so that the inertia of the heavy boom on the trolley head is entirely overcome. The result of this abnormal spring pressure is that a very serious blow is given at every point of support to the trolley wire. This will be observed in practice both in the jerk which is noticeable to the riders on the car and also in the vibration received by the supporting columns at the side of the road.

Under such treatment it is easy to conceive that damage is caused to the construction. Several devices in the form of special trolley heads have been brought out to obviate this difficulty, wherein the bearings of the trolley wheel spindle have been supported on springs or other devices to counteract the jar and allow the wheel to move slightly without affecting the slant of the boom. These heads, however, have never become really popular with tramway engineers, generally because they were loath to depart from established standards, thinking that they might only involve themselves in troubles worse than those with which they already had to contend. Such a policy does not show any originality in endeavouring to secure the reduction of expense in overhead maintenance. The engineer has just excuse for trying new devices, but he likes to be assured to some extent that they have succeeded in other cases.

A trolley head has just been put on the market under the name of "Springbok." This head, shown in the accompanying illustration, is the design of a practical engineer for use upon his own system, where it has been applied to several hundred cars. The great advantage of the adoption of this head has been shown by the report of the overhead line superintendent. It rests in the fact that troubles due to broken ears and other defects have practically disappeared since the introduction of the head. The head itself consists of a hinge between the socket and harp. A spring is fitted in a segmental recess and engages a piston portion integral with the harp. The spring always works in compression, and is entirely enclosed and protected from the weather. The shape of the head is such that it is absolutely non-fouling, and owing to the spring it passes under frogs and crossings with the greatest ease, and with the entire absence of knock transmitted to the trolley boom. A further advantage is found in the fact that the tension of the spring in the base can be largely reduced with this head, thus entailing a lighter pressure upon the trolley wire and resulting in less wear. Not only is this advantage found in the trolley wire, but it is also seen in the life of the wheel itself. The noise produced by the head is very slight, there being an entire absence of the rattle noticed with the ordinary fixed pattern. The head is attached in the usual way. The "Springbok" head patent has been acquired by the Equipment and Engineering Company, of 2 and 3, Norfolk Street, London, W.C.

HULL'S DECORATED CARS.

Value of Art in Municipal Life.

(By A Correspondent.)

Many people still erroneously think that art is confined to the painting of pictures, and is to be found only in our picture galleries and museums. Art is far more comprehensive, and is capable of being, and should be, applied to the benefit of every object of common life, and it is the duty of all who have it in their power to produce things that combine use and beauty, and thus enable people to enjoy the pleasures that art can give. Our dull and dreary towns and cities can be made beautiful by the introduction of art in form and colour. All far-seeing observers and constructive thinkers will agree upon the importance of making a city attractive, even from a business point of view, and all will agree that the cultivation of taste is a mighty educational force.

The Corporation of Hull have demonstrated one step towards this desirable attainment by the introduction of artistically decorated tramcars, to which brief reference has previously been made in the

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Tramway and Railway World. This is but the first step they propose taking towards a definite attempt to combine beauty and utility, and to give joy and a fuller life to the people of the city. This crusade against grey and drabness is greatly appreciated by the citizens, who have warmly welcomed the cars. At the present time there is not only a public awakening to the value of art and to its capabilities, but also a realisation that art is their concern and a matter of rational judgment. The City Art Master, Mr. Brownsword's, decoration of these cars deals with the people's history and legend in a noble and dignified form.

Hull Corporation Car Decorated in Celebration of the Andrew Marvel Tercentenary.

This has been accomplished by good design carried out in a reticent scheme of four colours only—black, gold, blue, and white. The body of the car is in black and gold, relieved at intervals with spots of colour by the introduction of heraldic arms and symbolic ships. Round the upper deck is a continuous frieze of figures in white upon a blue ground with detail in black and gold. These figures portray important characters of the period the decoration illustrates—1621 to 1678—Charles I., Charles II., Cromwell, Prince Rupert, Puritans, Courtiers, Ecclesiastics, etc., and are grouped in a pleasing manner. Round the roof is a frieze of gulls conventionally treated in gold upon a black ground. This artistic addition to the city has been produced very economically, labour and colour being given.

Mr. J. J. Brownsword, A.R.C.A., Principal of the School of Art, an enthusiast in design, designed the scheme of decoration, and the staff and students of the school carried it out under his direction. Messrs. Sissons Brothers and Blundell and Spence, two local colour manufacturers, gave the material. This generous public spirit is to be commended, and the happy result arrived at by the combination of local art and manufactory is a credit to those concerned. Mr. Brownsword is to be congratulated upon the design, and also upon the happy idea of providing an opportunity for his students of gaining practical experience in carrying out a complete scheme of decoration.

The chairman of the Tramways committee, Councillor Digby Willoughby, may be commended for his foresight in originating the idea, with the object of marking the Andrew Marvel Tercentenary in March last. Mr. Brownsword has been asked to design other cars on similar lines, to devise a colour scheme for the tramway standards, and to decorate a room at the Guildhall.

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THE EDITOR will be glad to consider articles by experts. All information of a practical character relating particularly to the engineering and operating branches of transportation will receive prompt attention. Original illustrations will also be welcome.

LONDON, MAY 19, 1921.

Alternative Fuel. Withdrawal of Sunday services and the limitation of weekday facilities have been generally made without waiting for instructions from Whitehall. Although power-station bunkers during the period of extra output preceding the miners' strike were overflowing, so that orders had to be given for deliveries to cease, managers have recognised the fact that stocks had to be treated like veritable black diamonds if power and lighting requirements were to be met for any considerable period. In one direction only was it possible to look for an alternative fuel, namely, oil. The lead in this innovation appears to have been taken at Hull and Grimsby, where the port facilities for storage were largely increased during the war. On April 29 the use of oil at Hull had enabled the coal consumption to be reduced 75 per cent., the quantity having been cut down from 230 to 50 tons per week. By May 2 the fourth boiler was fitted for burning oil. Port storage for oil was also largely added to at Liverpool and at South Wales while hostilities were in progress, and for some time the oil companies have been extending their facilities at those centres. It does not appear, however, that power-stations in those places have yet turned to oil fuel. At Hull and Leeds cars were run on oil fuel early in the month. About the same time an intimation was made that the London Underground Railways had decided to adapt many of the furnaces at the generating station to the burning of oil. At the time of writing the change over had been almost completed, together with a further installation which renders the station practically independent of coal. Owing to the existence of the immense storage at Thameshaven, kept constantly filled from vessels coming from overseas, and the capacious storage available at inner points on the river, power-stations in London are better situated for oil consumption than most of the great cities in this country. Moreover, the price of oil is stated now to approximate more nearly to that of coal, while so far as heat units are concerned, oil is decidedly cheaper. Lately the distributing companies have lowered their prices from £8 to £4 10s. per ton, while for Diesel engines the charge has fallen from £11 to £6. As to the time required for conversion to oil burning, Mr. S. H. North, the expert in oil-driven machinery, has stated that a furnace can be transformed in less than an hour, and that storage and supply piping can be fitted and a furnace got to work in less than a week. From East Lancashire comes the news that so many factories have undergone conversion that the demand for oil exceeds the supply. The tanks have been erected over the boilers, the oil passing to the furnaces through sprays. Providing that oil continues obtainable, the present experience is likely to be instructive as regards the saving in labour, all round cleanliness, and the solution of the ash removal problem.

Set-back for Tramways. The tramways of the country have suffered their full share of the evil effects of the coal stoppage. A glance at the traffic returns which we publish from week to week, and which are summarised on another page of this issue, reveals the unfortunate reverse experienced by many undertakings as a consequence of this blow to industry. As the coal stoppage has been prolonged, so has the falling off in the receipts from fares been marked. The result is that more and more concerns are showing a deficit as compared

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with the corresponding period of last year, where before the coal shortage a similar comparison revealed an increase. While some allowance must be made for higher scales of fares, it is obvious that the dislocation of industry during the past weeks was bound to find its reflection in the extent to which tramway cars were used. Not only have people—especially in the great industrial centres—less money to spend on fares, but the necessity for boarding a car at all has vanished with the employment to which that car used to take them. Practically all undertakings have, of course, been forced to curtail their services to extents varying with the size of their coal reserve, but the incidental saving in running expenses has not been sufficient to counterbalance the loss of fares. At the time of writing the coal dispute is not ended; whether it be dragged out much longer or not, one thing appears certain, the budgets of tramway undertakings for the financial year just opening will have been badly distorted and may need re-casting. All this is particularly unfortunate at a time when tramway concerns have quite enough to contend with without convulsions arising outside to disturb them. On the whole, managers have one slight consolation—if consolation it may be called—whatever ill effect the present chaos leaves on their final balance sheet, the cause did not lie with them, and was beyond their control. The result is one of those things which must simply be faced and endured.

Fares and Wages.

The coal miners' strike has indirectly rendered the position of all tramway undertakings exceedingly difficult. Unemployment is so serious that there must be a very large decrease in tramway revenue. Added to this is the effect of considerable reductions in wages in a number of trades. The spending power of the people is for this reason permanently reduced, and it would be foolish to anticipate a continuation of the bumper traffics that have been received for the past few years. In the meantime, as a consequence of inflated prices of all material and the increase of wages, tramway undertaking have increased fares. It was, indeed, impossible for them to refrain from taking this course, although few of those responsible failed to see the dilemma that now confronts the industry. To maintain fares at the present level for a long period is impracticable. With falling wages and the drop in the price of commodities tramway fares clearly must react sooner or later. It is natural that authorities should still approach the Ministry of Transport for permission to increase fares, but few undertakings are in a position to improve their receipts by adding to their charges. They will be better employed in efforts to reduce their working costs. In one direction it is necessary—unpleasant as it may be—to effect considerable economy. Wages must be reduced. The recommendation of the Court of Inquiry in March last that wages should remain at their present level until the end of the year was made in circumstances considerably different from those that now prevail. The ratio of the cost of living as compared with 1914 has already fallen to 228, and it may reasonably be expected to be no more than 200 by the end of the summer. The situation could not have been foreseen when the court agreed upon its recommendation, or if it was, the bearing of such a change as has taken place was imperfectly apprehended. Possibly there was some sacrifice of prevision on the part of some members of the court in their desire to secure unanimity in the report. Whatever the causes that underlay the recommendation, it must by this time be apparent to all the members that tramway authorities are not in a position to act upon their advice. Even to the leaders of the men's unions it must be tolerably clear that, however much tramway authorities may wish to maintain wages, they cannot do so. They cannot compel people to use the tramway cars; they can only encourage them to do so by offering such fares and services as will make it worth while for them to ride. This cannot be done so long as wages remain at the present rates.

Industrial Council and Inquiry Report.—At a meeting of the National Joint Industrial Council, held on April 28 in London, the report of the Court of Inquiry into the tramway industry was under consideration, and the following resolution was unanimously approved:—"That the report and the recommendations of the Court of Inquiry be referred for consideration and report to a Joint Committee of the Council of five members from each side, such committee to report by June 9." It will be recalled that the chief recommendation of the Court of Inquiry was that the present wages standard should be maintained until December 31 next.

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LONDON TRAFFIC PROBLEM.

L.C.C. COMMITTEE RECOMMENDS UNIFIED CONTROL.

The Special Committee of Inquiry on Tramways appointed by the London County Council in March, 1920, presented a long report —which was adopted—at the meeting of the Council on May 3. In the course of this they state they have considered several methods for dealing with the London traffic problem as a whole, and effecting such an improvement in the present arrangements as will enable the best use to be made of the existing facilities. Unlike most of the large cities in the provinces and abroad where one authority reigns supreme, it is necessary to have in mind, the report proceeds, the fact that in the London area there are some 122 road authorities exercising various powers of control. At present, with certain exceptions, no very effective limitation exists as regards the number or character of road passenger transport services which may be introduced into the area. As the result of this state of affairs there are now being operated in the area about 17 systems of separately operated tramways, and also a large number of motor omnibus undertakings. In addition there are numerous local railway sytems which form an essential part of the local transport system. These various traffic undertakings, except to the extent to which certain of them have been combined under one direction, are worked as distinct systems without any common guiding principles of operation. The existence of these factors makes a completely satisfactory solution of the question extremely difficult, but the committee are of opinion that all parties concerned should face the situation as it exists and endeavour to arrive at such a settlement as in all the circumstances holds out the best prospect of effecting improvements.

Regulation of Competition.

"Perhaps the fact which has been most impressed upon us," the report continues, "as the result of our deliberations has been the impossibility of effecting anything like a permanent improvement until some concerted effort is made to regulate the present unrestricted competition between the various means of local passenger transport. While we recognise that in many respects the existing facilities require to be supplemented in order to meet the requirements of the public, we are satisfied that if the undertakings now operated were worked in co-ordination, very great benefits could at once be secured for the public, while considerable financial advantages would accrue to the individual undertakings.

"In considering any arrangements which it might be desirable to make to secure this co-ordination and common working as between existing undertakings, we have kept before us the essential condition that any step taken in this direction must be accompanied by adequate provision for public control, so that the interests of the travelling public may be safeguarded. We consider that the only satisfactory and effective form which this control could take if arrangements were made for the operation of the existing undertakings on unified lines, would be by means of a municipal body elected by the local authorities in Greater London, it being clearly understood that the setting up of such a body should be regarded as a temporary measure pending the reorganisation of local government in Greater London"

The committee proceed to point out that they have examined the "service at cost" methods of operation which are in force in many American and Canadian cities, and under which the city authorities, or a special public authority, grant a franchise to private undertakings to operate tramways systems in their area. The committee are of opinion that an arrangement of this kind might well form a basis on which to remodel the present chaotic traffic system of London.

Conferences with Competing Interests.

The committee therefore consider, the report proceeds, that the most hopeful remedy is to be sought on the lines of unified operation, coupled with municipal control. They recall, in connection with the question of the competition that now prevails, that the Council, in July, 1920, decided to ask the Minister of Transport to receive a deputation to place before him the position of the Council's tramways undertaking and the alternative courses that appeared to be available for meeting the serious financial situation. As the result, representatives of the Council discussed the whole question with the Minister at an interview on July 15, 1920, and it was arranged that the Ministry should convene a conference of representatives of the Council and of the omnibus undertakings to discuss particularly the question of the acute rivalry between the tramways and motor omnibuses on certain routes in London. The Council accordingly appointed representatives to confer with the representatives of the London Underground group of companies, with whom the London General and other omnibus companies are associated. The first meeting took place on July 21, 1920, under the chairmanship of the Minister of Transport, and since then a series of meetings have been held between the two sides, under the chairmanship of Sir Alexander Gibb. From the report of the Council's representatives it would appear that their conclusions go far to confirm the view now set forth by the committee.

"The question of the relationship of existing undertakings and the establishment of a Traffic Control Authority for Greater London," the committee point out, "is of such obvious public importance, and one that affects so many interests, that no satisfactory settlement can, we think, be hoped for unless the Government takes the matter in hand by arranging to bring together the various authorities concerned, and subsequently by formulating the legislative measures that will be necessary."

Committee's Recommendations.

The report concludes with the following recommendations—

(*a*) That the Council earnestly desires the introduction by His Majesty's Government of legislation to make provision for the unified operation of local passenger transport undertakings in Greater London and for the setting up for such area of a municipal traffic control authority (to be appointed by the local authorities affected), it being understood that the establishment of such an authority shall be regarded as a temporary expedient pending the settlement of the question of the reorganisation of local government in Greater London, and that in the event of a new governing authority being set up for the area with the requisite powers, such authority shall take the place of the municipal traffic authority herein referred to.

(*b*) That the terms of the foregoing resolution (*a*) be communicated to the Minister of Transport and that the Minister be informed that the Council will be glad to co-operate by participating in conferences and otherwise, in any steps that it may be considered desirable to take as a preliminary to the introduction of such legislation.

OIL FUEL REPLACES COAL.

The collapse of the coal supply, due to the stoppage of the mines since the beginning of April, has led several tramway undertakings and the London Underground Railways to substitute oil fuel at their generating stations, and the results have been watched with great interest. Among the first municipal tramway concerns to lead the way were those of Hull, Leeds, and Newcastle-on-Tyne. The type of installation manufactured by the Gretna Engineering Company, of Carlisle, was first adopted by Mr. E. S. Rayner, the manager at Hull, with the result that the car service was kept at normal, while with similar equipment Mr. J. B. Hamilton, the Leeds manager, quickly restored the tramway facilities which had been depleted by over 50 per cent.

The Gretna equipment used at Leeds consists of an oil burner to which is fed oil after being passed through a heater and filter. The oil is forced through the nozzle of the burner by means of steam pressure, and throws out a sheet of flame which impinges on a bricked-up back about 7 feet from the front of the fire. The oil used is supplied by the Anglo-American Oil Company, and is known as the standard grade ·950 specific gravity.

At the time of writing, other tramway undertakings, including those of the London County Council, Liverpool and Sheffield are taking steps with a view to utilising oil fuel, while the Bristol Tramways and Carriage Company, Limited, have equipped part of their boiler plant with burners. At the meeting of London County Council on May 10, Mr. W. J. Squires (chairman of the Highways Committee) stated that the question of adopting fuel oil at Greenwich power-station had been under consideration for some time, and estimates had been prepared for a scheme for converting four Babcock boilers for oil burning. Further action was being taken that day, he added.

London Underground Railways.

A statement issued by the London Underground Railways on May 11 showed that oil fuel was being utilised partially in place of coal in the Lots Road generating station. Sixteen boilers had then been adapted. "Ordinarily it is necessary for 52 boilers to be in operation to deal with the rush hour traffic on the Underground," the statement proceeds. "Each boiler consumes on the average one ton of coal per hour. The boilers equipped for oil fuel are in service approximately 20 hours per day, thus saving in coal on the 16 boilers roughly 320 tons per 20-hour day. Eight of the boilers are equipped on the pressure-fed system, whereby the oil is forced into the furnaces by air pressure. The remaining eight work on the suction principle, in which steam is utilised to eject the oil. The supply of oil fuel is pumped direct from 250-ton tank barges—which are moored in a dock—into a small storage tank which feeds the boiler installation. These barges are kept fully loaded by a service of auxiliary barges which ply between the power-house and Thames Haven. The order to proceed with the fitting of the necessary equipment to the 16 boilers was only given on May 4."

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ELECTRIFICATION OF EDINBURGH CORPORATION TRAMWAYS.

A Report by the Tramways Manager, Mr. R. Stuart Pilcher. Conversion of the First Section—Estimates of Cost.

In a report dated February 1919, the whole question of the transport system was dealt with, and, following upon the recommendations made in that report, the Town Council, on February 26, 1919, decided to convert the cable system to electric traction, the first section to be the Pilrig to Liberton route, leaving details to be dealt with later In these circumstances I do not propose to go over the same ground again, but rather to deal with definite proposals for electrifying the first section, and giving estimates for carrying out this work.

RE-ROUTING.—CHANGE OVER FROM CABLE TO ELECTRIC SYSTEM WITHOUT STOPPAGE OF TRAMWAY TRAFFIC.

In considering the electrification of the system, I have kept in mind the desirability of changing over from the cable system to the electric without any stoppage of the tramway traffic. With the closing down of Shrubhill power-station, which drives the cable ropes on the first section, it will be necessary to rearrange some of the routes. Shrubhill car shed at present houses 120 cable cars, and even after provision is made at the Leith shed for electric cars for the Liberton route, it will be necessary to accommodate a number of the cable cars at Shrubhill depot. Means will therefore require to be provided for bringing these cars housed at Shrubhill to and from the city until such time as more of the routes are electrified.

I have arranged for the Princes Street cable to be extended to Pilrig, which will enable the cable cars to be run to and from the depot, and will also provide a service of cable cars, viz., Gorgie and Braids routes, to run to Pilrig. The route from Pilrig to Nether Liberton would run as at present, and would be entirely electric. The route from Liberton to Murrayfield would be discontinued, the Murrayfield cars being turned at the Post Office, until the Princes Street section is electrified.

The Churchill and Marchmoat Road route would be discontinued as a tramway, but would become a motor omnibus route. The present omnibus route from Goldenacre *via* Hanover Street and the Mound to Tollcross would be extended *via* Marchmont Road and Kilgraston Road to Blackford Hill. Another route would be run from Churchill *via* Grange Road, Salisbury Place, and the Post Office to the West End.

The closing down of the Marchmont tramway will enable an extra length of rope to be added to the Princes Street section, and will permit some of the latest top-covered cable cars to be converted for use as electric cars. An electric car service would be provided between Abbeyhill and South St. Andrew Street.

EXTENSION OF CAR SHEDS.

One of the chief reasons for dealing with the conversion of the system in sections is the saving in building construction which this method makes possible. The shed accommodation for the present cable cars is very restricted, so much so that an extension has been made to the Portobello depot this year. There is no available shed accommodation for new cars, and, further, the cable car sheds are not suitable for housing electric cars to any considerable extent. It is therefore necessary to provide some new accommodation.

Prior to the amalgamation with Leith tramways, it had been my intention to recommend the construction of a new electric car shed, to be situated in the Lower Shrubhill yard, north of the existing car shed, but now that the Leith system has been joined up with the Edinburgh system, the most desirable site for additional accommodation is at the Leith depot, where there is ample room for a large new shed. I propose that an extension be made on to the front of the Leith shed, sufficient to house forty electric cars. This extension would be a duplicate of a section of the existing shed, and could be added to as and when required. The extension of the Leith shed and Leith electric system will be more simple, efficient, and economical than would be the creation of a separate unit at Shrubhill. Plans will be placed before the committee by the city architect, showing the proposed car shed, which is estimated to cost as follows—Car shed buildings, £22,000; overhead equipment, £116; permanent way, £1,837; total, £23,953.

This building will be used solely as a car shed for housing purposes. The repairs, overhauling, painting, etc., will be carried on at Shrubhill depot, where a new wheel shop has been already provided to deal with the additional repairs, due to the electric system. In the Shrubhill depot it will be necessary to erect overhead electrical equipment, and to bond the rails, so that a portion of the workshops will be available for electric car repairs. It will also be necessary to make certain alterations to the roof girders to provide sufficient clearance for these cars.

The closing down of Shrubhill power-station will involve the provision of power to drive the traversers which are used to take the cable cars in and out of the depot. I propose that these traversers be driven electrically. An electric drive will be more reliable and speedier than the present arrangement. These alterations are estimated to cost as follows—

	£
(1) Alterations to roof girders	1,080
(2) Alterations to main entrance	600
(3) Overhead electrical equipment	813
(4) Permanent way and pit accommodation for thirty cars	5,901
(5) Bonding of existing rails	41
(6) Electrification of traversers	811
(7) Provision of gangways for cleaning purposes	220
(8) Alteration to plant at Tollcross power-station	411
Total	£9,877

OVERHEAD EQUIPMENT.

The estimated cost of the electrical overhead equipment, including section boxes, is £19,989, comprising 4 miles 525 yards at £4,650 per mile.

PERMANENT WAY.—RENOVATION BY ELECTRIC WELDING.

The existing permanent way is of considerable value, and it is desirable to use as many of the rails as possible. The weight of the rail at present in use is 83 lb. per yard, whilst for electric traction the latest practice is to lay rails of about 105 lb. per yard; where the traffic is exceptionally heavy, heavier rails are used. I do not think that the existing rails are too light for electric traction. Rails of this weight which have been in continual use for eighteen years, and are at present in use for electric traction. Most of the permanent way on this section of the tramways is in good condition, and although the rails are rather light, there is no reason why they should not be used for electric cars for some years to come, provided the rail joints are in good condition. The Ministry of Transport have sanctioned the use of these rails for electric traction. The plan of conversion suggested is to bond and weld the existing rails, and, where worn out, to renew them. The following portions are in good condition and only require to be bonded and welded—

	Miles	Yards
Pilrig to Salisbury Place	2 ...	75
Lady Road to Nether Liberton	— ...	410
London Road, from Leith Walk to Abbey Hill ...	— ...	1,090
York Place, from Leith Walk along South St. Andrew Street to Princes Street	— ...	920
Total	3	735

The cost of this work is estimated at £1,600 per mile, a total of £5,468.

The rails along Minto Street, from Salisbury Place to Lady Road—distance of 1,550 yards—are rather badly worn, but during the last few months I have been experimenting with them by welding up the rail surface at the Dicker joints. This welding has been successful, so much so that I would hesitate to recommend the renewal of these rails at present. I have been able practically to eliminate the joint, and have filled up the worn portion with new metal, deposited by the electric welding plant; the joints being renewed, the rails become of considerable value, and I therefore recommend that these rails be bonded. It may be possible to obtain considerable wear from them. In any event a more satisfactory reconstruction can be made after the electric service starts than during the operation of the cable system. The cost of bonding this section would be £99, and the cost of renewal after electrification is estimated by the burgh engineer to be at the rate of £27,000 per mile, or £23,778 for the section referred to.

In connection with the electrification of the first section, there are isolated parts where a few rails will require to be renewed. The curve at York Place will need to be relaid with heavier rails, and the Picardy Place Junction renewed. The cost of these alterations and renewals I estimate at £2,318.

CROSS-OVERS AND POINTS.

For operation by electric traction new cross-overs will be required at Newington Station, Nicolson Square, and St. Andrew Square. There will also require to be minor alterations to the present points. The estimated cost of installing the additional cross-overs, including alterations to points, is £1,153. The total cost of the permanent way for the first section, excluding the car shed junction, is estimated at £32,816. The operations of bonding and welding I propose to carry out by the staff of the tramway department, and as it can only be carried out during the night, it will take a considerable time. I should therefore wish the sanction of the committee to start at once on the welding and bonding in preparation for the electrification of the system.

ROLLING STOCK.—SINGLE TRUCK CARS WITH FRONT EXITS.

I have previously dealt with the size and type of car most suitable for city service in this country. (Minute of Council dated 18th March 1919—"It was tentatively agreed that future cars should have a body saloon 17 feet in length, carrying 24 passengers inside and 32 outside.") The fifty top covers at present being fitted to the cable cars were built expressly to suit electric cars.

The size of a tramway car is governed by the nature of the traffic. When passenger traffic consists of many short-distance travellers, such as we have in Edinburgh, where the 1d. passengers constitute

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25 per cent. of the whole, it is advisable to confine the size of the car to a carrying capacity of 58 or 60 passengers, the car to have an overall length of 31 feet. If larger cars than these are used, it causes more stopping and consequent slowing down of the schedule speed at which the car can travel. The speed of the car is largely governed by the number of stoppages. When the time arrives to consider the construction of cars for suburban traffic, the conditions of which are somewhat different, consideration may be given to vehicles of a larger type.

The cars which are required for the first section of electric tramway should be fitted with top covers. The climatic conditions in Edinburgh necessitate that practically all the regular service cars should be covered in on top; open seats for four passengers could be left at each end of the cars. The ventilator windows should be arranged to open horizontally instead of vertically; this will insure more efficient ventilation. The side windows in the top cover would be fitted with balancing springs, and made to open 20 inches.

The lower saloon would be handsomely panelled in teak, and I would suggest the fitting of upholstered cushions and back rests of leather or patent cloth. The upholstering of seats gives the inside of the car a handsome appearance, and provides a comfortable seat, whilst enamelled cloth prevents the retention of any insects. The platforms would be spacious—about 6 ft. 1 in. in length—and provision would be made for the protection of the driver by a permanent vestibule fitted with opening windows. Front exits on the safe side would be provided with folding gates and steps operated by the driver. The extra exits are only intended to be used at the termini and at busy stopping stations.

An Edinburgh Cable Car Converted to an Electric Car with Front Exit.

In considering the type of under carriage to adopt for new cars of the size indicated, it is possible to use either single trucks, similar to those fitted on the Leith cars, or double bogies, similar to those on the Edinburgh cars. Single trucks can be obtained to work successfully with a wheel base up to 9 ft. On these trucks the axle-boxes are fitted with links, which give a certain amount of play to the axle when rounding curves. The long wheel base reduces the galloping action (common to short wheel base trucks). Two samples 7 ft. 6 in. wheel base trucks of the latest design have been put into operation on the Leith electric system.

ELECTRICAL EQUIPMENT AND BRAKES.

Considerable progress has been made in recent years in the ventilated types of motors, forced ventilation being introduced in order to reduce the temperature. The lowered temperature reduces the amount of current consumed, increases the life of the internal parts of the motor, keeps the machine free from dust, and lengthens the life of the bearings. If single trucks were adopted, or maximum traction trucks, the motors would require to be 35 H.P. Two sample sets of motors of the latest inter-pole ventilated type have been placed in operation on the Leith electric system.

The most important part of the equipment of a tramway car may be said to be the brakes. Several brakes should be provided, so that if the driver has difficulty in stopping the car with one brake, he can use another brake. The brakes should be, as far as possible, fool proof, and independent of each other The brakes suggested for the cars on the first section of the tramway are as follows—(1) Ordinary hand wheel brake fitted with Ackley attachment, and (2) magnetic track brake (3 tons) operated from car motors acting as generators. If and when the routes are electrified, where the gradients are steep, I would recommend an additional power track brake.

CONVERSION OF CABLE CARS.

The present rolling stock consists of 184 cable cars. Of these cars 92 are provided with top covers, and of the top covers 30 are quite new. The bodies were recently overhauled, and new corner posts and side pillars have been fitted. There are still 20 top covers to be erected. Having regard to the condition of these rebuilt cars and to their suitability for conversion when fitted with top covers, I am of the opinion that a certain number of them should be converted for electric traction.

The cost of a new lower saloon would be £1,500, and a new top cover £500, making a total of £2,000. The existing top-covered cable cars can be converted the same as the sample car for £300 each, so that for each car body adapted there would be a clear saving of £1,700.

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In considering the type of electrical equipment to adopt for new rolling stock, it is necessary to consider very carefully the latest developments both in this country and in America. The war has left behind economic conditions which have very seriously affected transport conditions the world over. Working expenses must now be reduced if the industry is to survive, and this fact has made it imperative for traction engineers to find ways and means of improving the efficiency of their plant, and of reducing the maintenance charges. The result of these efforts is to be seen in the reduction of weights—the weight of bodies, the weight of trucks, the weight of motors. The reduction of weight usually means increased speeds, less power consumption, less wear and tear on permanent way.

Another question which has received attention, and which has been vastly improved, is that of the lubrication of motor bearings. The latest motors will run two or three years without renewal of armature bearings, whereas in previous designs the bearings required replacement every four months; and lastly, the adoption of ball and roller bearings, which have the effect of reducing power consumption and the cost of lubrication.

In applying these developments to the Edinburgh system, we find that the existing cable car is of light weight compared with the ordinary electric cars in use throughout the country—it weighs 8 tons 16 cwt., compared with electric cars on other systems, which range from 9 tons to 20 tons.

In this connection a trial has been made of fitting up the existing bogies to suit electric traction. The bogie wheels have been increased from 22 inches to 24 inches in diameter, stronger axles have been fitted, and the springing of the truck re-designed to suit the different conditions. The hand brakes have been altered to improve the braking, and magnetic brakes have been fitted. The journal boxes are fitted with roller bearings, and the pressed steel frames electrically welded together.

On to these pressed steel bogies there have been fitted two 27 H.P. light-weight inter-pole ventilated motors—each motor weighs only 1,000 lb., as compared with previous motor weights of 2,000 lb. each. The difference in weight between the electrical and mechanical equipment on the sample car, No. 36, and the electric car which used to run on the Slateford route is as follows—

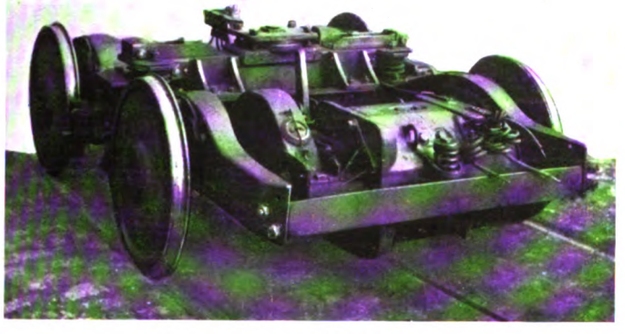
	T.	C.	Q.
Slateford electric bogies	6	0	2
Sample electric car	3	8	2
Difference in favour of sample car	2	12	0

WEIGHT OF COMPLETE CARS.

Top-covered cable car (Brown Marshall type)	8	16	0
Top-covered cable car (Preston type)	9	8	0
Top-covered Leith car, single truck	11	2	0
Sample double bogie electric car	8	9	0

The difference in weight in favour of the sample converted car is rather remarkable, and enables greater speed to be obtained with less maintenance costs as regards power consumption and wear and tear on the equipment and on the permanent way. The type of motor used on the sample light-weight car is used by eighty-nine different undertakings in America, there being 2,004 light-weight cars in operation. These motors are recommended to the New York Railways Company as an effective means of reducing maintenance charges.

Tests have been carried out on the sample car which show that a maximum speed can be obtained of 17½ miles per hour on the level, and 11½ miles per hour on a gradient of 1 in 20. If it is thought desirable, more powerful, viz., 32-H.P. light-weight motors, can be obtained to suit these bogies, and for the purpose of extensively trying these motors I propose to place the sample car in regular service, after which I will again report to the committee.



Truck Equipped with Electric Motors.

The conversion of the car bogies on the lines indicated will not only be economical, but will be in keeping with the most advanced practice in electric traction, and I beg to recommend accordingly.

NUMBERS.

The routes to be operated on the first section would be as follows—

Route.	No. of Cars Required.
Pilrig to Nether Liberton	20
Pilrig to Salisbury Place	9
Abbeyhill to St. Andrew Street	10
Spares	8—47

In the first instance I think it will be sufficient to invite tenders for the supply of 16 new cars. Arrangements could be made for converting 31 of the existing cable cars. For this purpose I would suggest that tenders be invited for 29 additional electrical and mechanical equipments.

ESTIMATED COST.

	£
(1) 16 car bodies at £1,500 each	24,000
(2) 31 cable cars, with new top covers, to be converted, at £300 each	9,300
(3) 45 electrical and mechanical equipments, at £1,400 each	63,000
	£96,300

The estimated cost of electrical and mechanical equipment at £1,400 per car provides for new bogies for 16 cars, and for converting the existing bogies of 31 cars.

EXTENSIONS.

The construction of tramway extension at present prices is quite prohibitive. Extensions can more suitably be dealt with by motor omnibuses. When the costs of permanent way construction are reduced, extensions such as Nether Liberton to Liberton, and Murrayfield to Corstorphine can be dealt with. In this connection it would probably be better to move the Slateford tramway rails and equipment for the purpose of building the first extension. In the meantime I would suggest that this equipment should not be removed.

SUMMARY.

ESTIMATE FOR ELECTRIFICATION OF FIRST SECTION.

(1) BUILDINGS.

	£	£
Extension of Leith car-shed to hold 40 additional cars ...	23,953	
Shrubhill Depot.		
Alteration to roof girders	1,080	
Building alterations for traversers and entrance ...	600	
Overhead electrical equipment	813	
Permanent way and pit accommodation for 30 cars ...	5,901	
Bonding of existing rails	41	
Electrification of traversers	811	
Provision of gangways for cleaning purposes	220	
Tollcross Power Station.		
Alteration to plant	411	
		33,830

(2) OVERHEAD EQUIPMENT.

4 miles 525 yards at £4,650 per mile		19,989

(3) PERMANENT WAY.

Bonding and welding 3 miles 735 yards, at £1,600 ...	5,468	
Bonding 1,550 yards, at £112 12s. per mile	99	
New curves, etc., York Place	625	
Junction to connect with electric lines at Pilrig, renewing Picardy Place Junction, straightening out incoming line at Newington Station, etc.	1,693	
New cross-overs, alterations to points, excluding car-shed	1,153	
Renewal, Salisbury Place to Lady Road, 1,550 yards, at £27,000 per mile	23,778	
		32,816

(4) ROLLING STOCK.

16 car bodies, at £1,500 each	24,000	
45 electrical and mechanical equipments, at £1,400 each	63,000	
31 cable cars, with new top covers, to be converted, at £300 each	9,300	
		96,300
		£182,935

GENERAL.

The foregoing report deals with the details of converting to electric traction the first section of the tramways. The estimates which are presented for this section are based upon current prices. I do not propose to present detailed estimates for the second and third sections, because in dealing with these sections the cost of reconstruction will depend on the condition of the undertaking immediately prior to the conversion. There is also every indication that prices for some important commodities will fall considerably within the next two or three years.

The second section—Portobello route—could be converted immediately following the first section, or as soon as sufficient accommodation could be provided in Shrubhill or elsewhere for more cars. The third section—Princes Street, Braids, Craiglockhart, Murrayfield, Gorgie—would follow in a similar way. Given sufficient electrical energy from the power station, the time taken to convert the system is only limited by the time taken to alter the car sheds and to equip the cars. The fourth section—Mound, Comely Bank, Hanover Street, and Broughton—is at present being worked by motor omnibuses. At the present level of prices it would not pay to lay down entirely new rails for these routes, with the exception of the Broughton route, on which line the rails from Leith Street to Canonmills are in good condition.

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If the committee desire to electrify the line from Leith Street to Goldenacre, it could be dealt with at the same time as the Liberton route.

However, for the guidance of the committee, I give the approximate cost of electrifying the first, second, and third sections on the lines indicated, with the addition of Grange Road, Marchmont Road, and Leith Street to Goldenacre, at £825,195.

In concluding, I would like to repeat the chief reasons why electrification should be proceeded with as soon as sufficient electricity is available.

(1) The public expect a more efficient and reliable system of transport as soon as it is possible to provide it, and this can be done by electrification.

(2) It is in the interests of the city that improved transport facilities should be provided, and that these facilities should include through running with the Leith system.

End View of Edinburgh Electric Car with Enclosed Platform

(3) A system of electric tramways can be operated at a lower figure per car-mile than is possible with the cable system, and although new capital expenditure will be incurred in electrifying, the saving in working expenses will more than cover the interest and sinking fund charges in respect of the new capital.

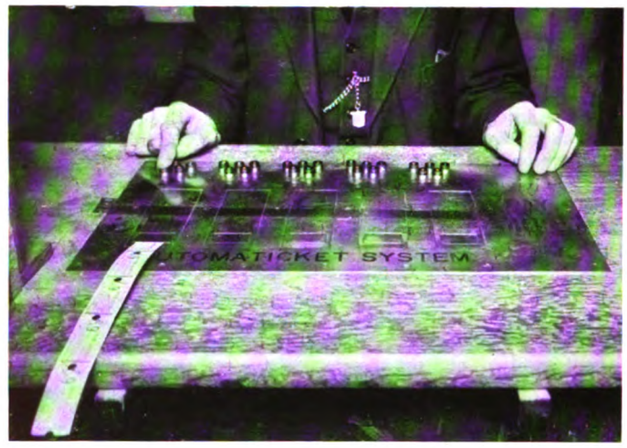
I beg to recommend that tenders be invited for the execution of the work connected with the first section.

Proposed Sale of Paisley Tramways.—At Glasgow Corporation Tramways Sub-Committee meeting, the Town Clerk reported that the committee had considered the letter from Mr. D. Johnstone Smith, one of the directors of the Paisley District Tramways Company, intimating that the directors of the company are agreeable to enter into negotiations with the Corporation for the sale of their undertaking. The sub-committee, having heard a report by the manager, agreed (1) to delay consideration of the remit made to them, pending the manager's sending a copy of his report to each of the members; and (2) that a meeting be arranged with representatives of the company.

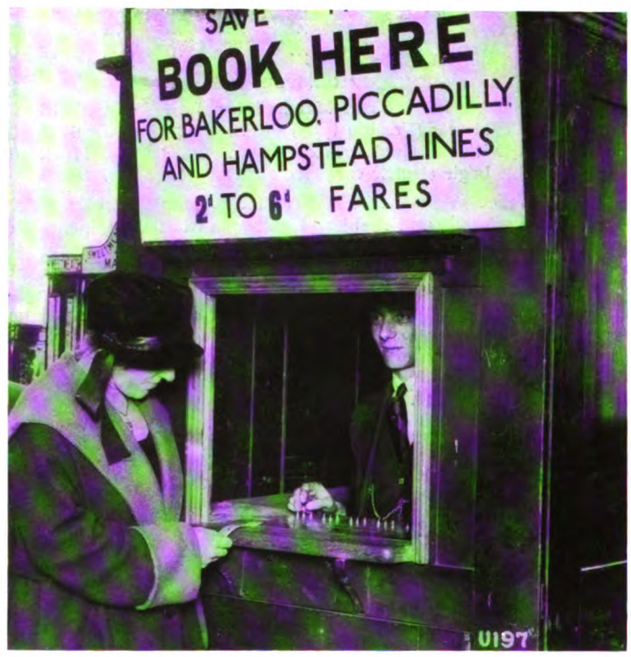
AUTOMATIC TICKET MACHINE.

UNDERGROUND RAILWAY'S USEFUL INNOVATION.

A new automatic ticket machine is now in experimental operation at Leicester Square Tube Station, London. A small temporary booking office, which is open on weekdays at the present time from 4 p.m. until midnight, has been erected, and tickets are issued for even money fares to stations on the Underground Railways at rates from 2d. to 6d.



The machine has five sets of buttons, and delivers tickets singly, or in twos, threes, fours, or fives. It is found especially useful during the evening theatre rush in dealing with parties. Passengers pay their money in the ordinary way for the issue of a ticket, and it is computed that by the use of this machine a booking clerk can deal with passengers at the rate of about 40 per minute.



Each of the five magazines in the machine is charged with a single strip of about 2,000 tickets. To issue a ticket, or tickets, the booking clerk presses a button, according to the fare and number of tickets required. The pressing of the button actuates the mechanism, and the tickets are delivered to the passengers through a small slot in front of the machine, as will be seen from the accompanying illustrations.

The Sunderland Chamber of Trades are considering a scheme for the use of omnibuses for linking the town with numerous towns in the district. Steps are being taken to secure the support of the local authorities.

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THE RAILWAY BILL.

SCHEME FOR GROUPING AND COMPENSATION.

The text of the Railway Bill, issued on May 12, provides for the reorganisation and further regulation of the railways, and extends the duration of the Rates Advisory Committee.

It is laid down that, with a view to the reorganisation and more efficient and economical working of the railway system of Great Britain, railways shall be formed into groups, and the principal railway companies in each group shall be amalgamated and other companies absorbed in manner provided by the Act. The constituent companies in any group may, on or before June 30, 1922, submit to the Minister of Transport an amalgamation scheme which has been agreed to by all those companies. The Minister shall refer to an amalgamation tribunal any scheme so submitted, and the tribunal, unless it appears to them that the scheme does not conform with the requirements of the Act, shall confirm it. If the constituent companies in any group fail to submit an agreed amalgamation scheme on or before the said date, a scheme shall be prepared and settled by the amalgamation tribunal.

Every amalgamation scheme and every absorption scheme shall be so framed as to come into operation on January 1, 1923, or such later date as the amalgamation tribunal, with the consent of the Minister, may fix. If, as respects any group, the amalgamation tribunal postpones the date to later than January 1, then, during the period of postponement, the undertakings of all the constituent and subsidiary companies shall be worked as one joint undertaking, and the net receipts shall be distributed amongst the constituent and subsidiary companies upon such terms and subject to such conditions and in such proportions as may be agreed upon by the several companies with the approval of the amalgamation tribunal, or in default of agreement as may be determined by the tribunal.

A TRIBUNAL OF THREE COMMISSIONERS.

The tribunal to be constituted shall be called the Railways Amalgamation Tribunal. It shall consist of three commissioners, who shall hold office until all matters with respect to which they have jurisdiction have been settled. The commissioners shall be

Sir Henry Babington Smith, G.B.E., chairman.
Sir Wm. Plender, G.B.E.; and
Mr. Geo. John Talbot, K.C.

The expenses of the tribunal shall be defrayed in the first instance by the Minister of Transport out of moneys provided by Parliament, but on the coming into operation of the amalgamation schemes the amount, with interest at such rate as the Treasury may appoint, shall, on demand, be repaid to the Minister by the amalgamated companies in such proportions as the tribunal may determine.

The Treasury shall, out of moneys to be provided by Parliament, place on deposit with the Bank of England the sum of sixty million pounds to the credit of a deposit account entitled "The Railways Compensation Account," and that sum shall be payable by two equal instalments of thirty millions each, of which the first shall become due on December 31, 1921, and the second on December 31, 1922, and each such instalment shall be paid within fifteen days after it so becomes due. The payment shall be a full discharge and in satisfaction of all claims, provided that the rights and liabilities of the Crown or the Minister on the one hand, and of the railway companies on the other, shall, so far as regards the making good of any deficiency in the net receipts of the companies—including the payment of interest—up to the end of the period of possession, and in relation to any sums expended and liabilities incurred by the companies in respect of repairs and renewals effected before the end of that period, subsist and continue.

DISPOSAL OF SIXTY MILLIONS.

The moneys so placed to the credit of the account, together with any interest which may accrue, shall be distributed amongst the railway companies in Great Britain in accordance with such scheme of allocation as may be agreed to by such companies, or, failing agreement, as may be settled from time to time by the tribunal. Out of the first instalment of thirty millions—

(*a*) The sum of 25 millions shall be forthwith distributed amongst the companies in proportion to the net receipts of those companies respectively during 1913, with certain supplementary sums; and

(*b*) The sum of five millions shall be distributed in respect of claims for compensation for any abnormal increase in the ratio of working expenses to receipts for the period commencing August 15 and ending December 31, 1921, as compared with the ratio of working expenses to receipts for 1913.

Out of the second instalment of 30 millions—

(*a*) The sum of 25 millions shall be distributed amongst those companies who on August 15, 1921, are in arrear in respect of the maintenance and renewal of their undertaking, in ratio to the extent to which they are so in arrear, and

(*b*) The sum of five millions shall be distributed in respect of claims for compensation for any abnormal increase in the ratio of working expenses to receipts for 1922, as compared with the ratio of working expenses to receipts for 1913.

No portion of the sixty millions or of the interest shall be allocated to any company which is not itself bearing the working expenses of conducting its traffic and maintaining its undertaking.

STANDARDISATION.

Dealing with the regulation of railways, the Bill lays down that, with a view to securing and promoting the public safety or interests, the Railway and Canal Commission may by order require any railway company, or the Minister may on the application of any such company by order authorise the company, to afford reasonable railway services, facilities, and conveniences.

The Minister may also by order require or authorise any railway company or any two or more railway companies—

To conform gradually to measures of general standardisation of ways, plant, and equipment, including methods of electrical operation type, frequency, and pressure of current; and

To adopt schemes for co-operative working or common user of rolling stock, workshops, manufactories, plant, and other facilities.

It is provided, however, that the interests of existing stockholders are not thereby to be prejudiced.

Save as is provided by the Bill, it shall not be lawful for any amalgamated company, without the consent of the Minister, to enter into agreements with another amalgamated company for the allocation of traffic, or the pooling of receipts, or otherwise for effecting a combination which would contravene the purposes of the Bill.

There shall be constituted two panels, one—the traders' panel—consisting of twelve persons nominated by the President of the Board of Trade, and the other—the railway panel—consisting of twelve nominated by the Minister after consultation with the Railway Companies' Association.

RATES AND FARES.

The Rates Tribunal shall, amongst other things, prescribe the rates applicable to the carriage of merchandise and the conditions under which those rates shall apply, and the fares for the conveyance of passengers and their luggage, and determine any questions in regard to the alteration of the classification of articles or of any standard charge. The charges to be fixed in the first instance for each amalgamated company shall be such as will, in the opinion of the rates tribunal, so far as practicable yield with efficient and economical working and management an annual net revenue equivalent to the aggregate in 1913, together with—

(*a*) A sum equal to 5 per cent. on capital expenditure, forming the basis on which interest was allowed at the end of the period during which the constituent companies and subsidiary companies were in possession of the Government; and

(*b*) Such allowance as appears to the rates tribunal to be reasonable in respect of capital expenditure on revenue producing works—not being less than £100,000 in the case of any work, and not being capital expenditure included in paragraph (*a*), which had not at the beginning of 1913 become fully remunerative.

As from the date when the railways cease to be in possession of the Minister of Transport, and until otherwise determined by twelve months' notice on either side—such notice not to be given before January 1, 1922—all questions relating to rates of pay or conditions of service of men to whom this part of the Act applies shall, in default of agreement between the railway companies and the trade unions concerned, be referred to and settled by the Central Wages Board, or on appeal the National Wages Board. Arrangements shall be made for establishing for each railway company affected one or more Councils, consisting of officers of the railway company and representatives of the men employed by the company, elected by those men.

WAGES BOARDS TO BE RECONSTRUCTED.

The Central Wages Board and the National Wages Board shall be reconstituted so that each such Board shall include representatives of the Railway Clerks' Association, in addition to representatives of the National Union of Railwaymen and the Associated Society of Locomotive Engineers and Firemen.

For the purpose of giving effect to the foregoing provisions, schemes shall be made by a committee consisting of six representatives of the General Managers Committee of the Railway Clearing House, and six representatives of the National Union of Railwaymen, the Associated Society of Locomotive Engineers and Firemen, and the Railway Clerks' Association.

The Rates Advisory Committee constituted under Section 21 of the Ministry of Transport Act, 1919, shall continue in existence so long as may be necessary, for the purposes of references under the Harbours, Docks, and Piers (Temporary Increase of Charges) Act 1920.

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FUEL OIL.

DETAILS OF AN EMERGENCY INSTALLATION.

The coal shortage has had the effect of bringing to the fore the advantages of fuel oil, the use of which has already been adopted in several tramway power-generating stations, including Hull, Grimsby, and Leeds. There is a good supply of fuel oil in the country, and it appears that the only factor which deters some managers from embarking on this alternative is that of installing burners. For the accompanying sketch of an improvised burner we are indebted to Alexander Duckham and Company, Limited, manufacturers of petroleum products, of 4 Broad Street Place, E.C.2., whose sales manager is Major Montague Skitt, B.Sc. This firm, we are informed, make their own burners in a few hours out of ordinary iron pipes, at a cost of about 10s. each, without valves or flex, and find them quite satisfactory as an emergency measure.

Oil fuel, they state in a memorandum, can be used either to supplement or to replace solid fuel. When used in conjunction with coal or coke it is necessary merely to direct the blast of the oil burner through a hole in the front of the firebox or door, on to the solid fuel. When oil is to be used alone, a special baffle is required for the flame to impinge upon. This may advantageously consist of chequer work with open spaces, say 3 in. square, and may take the form of a wall built across the firebox about 3 ft. from the front. A heap of firebrick will serve, but the better the design the better the results. In any case only a high grade firebrick should be used, since it will take the full blast of the flame, which is intensely hot, and ordinary brick is liable to melt.

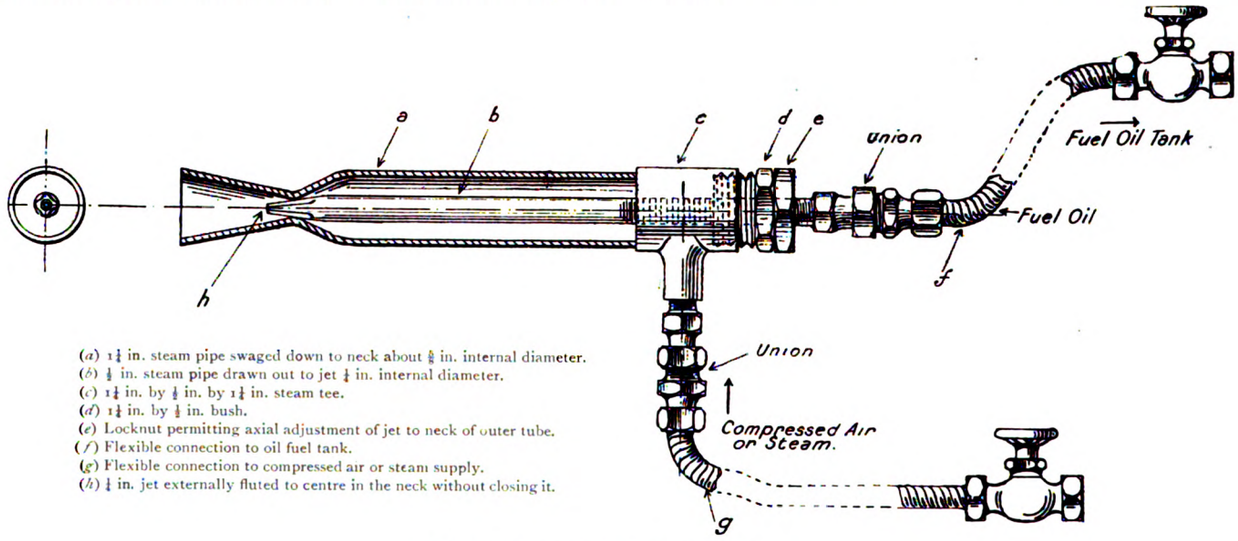
BURNERS.

The fire is always lighted by means of solid fuel, and it is essential that sufficient draught should be available before the burner is started. When the fire is well alight, the compressed air or steam is turned on and the oil valve gradually opened. Care should be taken to see that no unburnt oil spray or vapour goes past the fire into the flues, since an explosive mixture might be so formed. So long as the oil spray burns with a white or bright yellow flame, and little or no smoke issues from the stack, there is no risk, but the appearance of a murky flame yielding black smoke is evidence of incomplete combustion, due either to excess of oil or insufficient draught. The burner illustrated in the accompanying diagram requires mounting on a bracket or in a clip so arranged that it can be readily removed.

Presumably consumers of oil fuel in emergency will receive supplies in barrels. A tank may be set up a few feet above the burner, or a barrel can be used for the purpose, oil being hand pumped up as required. It is advisable to use a 20-mesh gauze strainer on the delivery side of the pump, to prevent solid particles from the barrel reaching and choking the burner. A fairly sensitive valve should be inserted in the down-pipe to control supply of oil to burner.

SPRAYING MEDIUM.

To ensure complete combustion of the oil before it is carried by the draught to the back of the furnace, it is necessary that it should be broken up into extremely fine spray. Dry steam at 50 or 60 lb. pressure does this work very well, but compressed air at 30 lb. or upwards is better, since it also assists in combustion. The heat economy with oil fuel installations is greater than with coal, but in the case of a temporary installation it will be safer to base an estimate on equal efficiency. Thus, if 100 tons of coal is the normal consumption, the oil required works out at about 68 tons. With a well designed installation it is possible to secure a further increase up to 30 per cent. in efficiency. Fuel oil averages 250 gallons per ton, and the burner illustrated will consume from 5 up to 40 gallons per hour. Light petroleum fuel oil is said to be the most suitable for an emergency installation.



(*a*) 1¼ in. steam pipe swaged down to neck about ⅝ in. internal diameter.
(*b*) ½ in. steam pipe drawn out to jet ¼ in. internal diameter.
(*c*) 1¼ in. by ½ in. by 1¼ in. steam tee.
(*d*) 1¼ in. by ½ in. bush.
(*e*) Locknut permitting axial adjustment of jet to neck of outer tube.
(*f*) Flexible connection to oil fuel tank.
(*g*) Flexible connection to compressed air or steam supply.
(*h*) ¼ in. jet externally fluted to centre in the neck without closing it.

Sketch of Improvised Oil Fuel Burner.

ROAD FUND LICENCE RECEIPTS.

Replying to Viscount Curzon, Sir E. Geddes, in the House of Commons, said that the gross amount from January 1 up to and including March 7 paid into the Bank of England in respect of Road Fund licences was approximately £7,085,000. Detailed returns had not yet been received from all local authorities, but a preliminary analysis of those received so far gave the following percentages, which might be taken as approximately correct—Motor vehicles, annual licences, 94·5 per cent.; motor vehicles, quarterly licences, 2·7 per cent.; horse drawn vehicles, 2·3 per cent.; miscellaneous receipts, 0·5 per cent. In further reply, the Minister said money from this source was now being allotted to the restoration of roads.

DECREASE IN LONDON'S ACCIDENTS.

The number of accidents to persons or property in which tramcars or motor omnibuses in the Metropolitan area were concerned shows a marked decrease during 1920. A comparison of the figures for the four respective quarters of the year is given below—

NUMBER OF PERSONS KILLED.

Vehicles.	Quarter ending—			
	Mar. 31	June 30	Sept. 30	Dec. 31
Mechanically propelled—				
Omnibuses	23	17	23	18
Tramcars	13	11	6	9
Trade and commercial vehicles	51	58	61	46

NUMBER OF ACCIDENTS TO PERSONS OR PROPERTY.

Vehicles.	Quarter ending—			
	Mar. 31	June 30	Sept. 30	Dec. 31
Omnibuses	957	826	760	815
Tramcars	1,137	943	957	978
Trade and commercial vehicles	2,499	2,307	2,322	2,605

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NEW MANAGER OF HALIFAX TRAMWAYS.

MR. BEN HALL.

The appointment of Mr. Ben Hall, who since September 1919 has been general manager and engineer of Wigan Corporation Tramways, to the managership of the Halifax Corporation system, which was announced in our issue of March 26, is now confirmed.

Mr. Hall, who is 36 years of age, was educated at Huddersfield College, and later at the Huddersfield Technical Institute After leaving college he served a regular apprenticeship to electrical and mechanical engineering, and was interested in the design, construction, and installation of plant for the power production and drive of large textile factories, workshops, etc., in the West Riding of Yorkshire.

He entered the tramway industry some 18 years ago as a pupil under Mr. H. N. Thomas, being articled for a further period of three years. Mr. Thomas—now general manager of the Durban (South Africa) Corporation Tramways—was at that time general manager and engineer of the Huddersfield Corporation Tramways Department. Passing through all sections of the undertaking, Mr. Hall gained a sound knowledge of tramway administration.

In 1907 he was appointed on the administrative staff as rolling stock equipment engineer. During his service at Huddersfield the system was largely extended, and on behalf of the department

Mr. BEN HALL.

Mr. Hall acted as clerk of works, generally supervising construction. From 1914 to 1918 he held an appointment under the Chatham and District Light Railway as general engineering superintendent. From 1918 to 1919 he was deputy borough electrical engineer and tramway manager to the Keighley Corporation.

It was in April 1919 that Mr. Hall was appointed under the Wigan Corporation Tramways and Motors Department as works manager and engineer, and in September of the same year was promoted general manager and engineer. The Wigan tramway system comprises a lay-out of 23½ route miles, or 32 miles of single track. The rolling stock owned and operated consists of 79 cars of various types (single and double deck), and nine motor omnibuses (petrol and petrol-electric drive), which operate as feeders to the cars and serve outlying townships.

During the year ended March 31, 1919, 19,623,874 passengers were carried. For the year ended March 31 last there were 20,922,998, or an increase of 1,399,124 passengers. The mileage run in this period was increased by 169,914, from 1,489,567, and with the increased mileage the receipts have increased proportionately. The population served by the system is well over 200,000.

Wolverhampton Tramways Committee have decided that to comply with the requirements of the Ministry of Transport, alterations in the specification for the supply of the eight single-deck tramcars in course of construction by the Brush Electrical Engineering Company, Limited, be approved, and that application be made to the Ministry for sanction to a loan of £280 in respect of the extra cost. They have also resolved that the quotation of the English Electric Company, Limited, amounting to £55 for the supply of 29 lightning arresters be accepted.

FUTURE OF CHESTER TRAMWAYS.

PARTIAL OMNIBUS SERVICE PROPOSED.

An interesting debate on the future of Chester Corporation Tramways took place at the meeting of the City Council on April 27, when important recommendations of the Tramways Committee were considered. A sub-committee of the Tramways Committee had for some time been considering the repair of the system and of alternative schemes, including railless trolley cars and motor omnibuses. They ultimately resolved that all information obtained be submitted to the Tramways Committee, together with the particulars of the estimated expenditure on alternative schemes, and that the committee be recommended to adopt a system which would involve the taking up of the tramway from the Castle to Saltney, and to provide that the ordinary service of tramcars should stop at the junction of Bridge Street with Grosvenor Street, from which point a system of motor omnibuses would be run to Saltney. It was resolved further that the acting city accountant be instructed to prepare a statement showing the division of the estimated expenditure of the alternative schemes as between capital and revenue. The Tramways Committee later adopted the reports of their sub-committee, and recommended that Mr. A. R. Fearnley, M.I.A.E., general manager, of Sheffield Corporation Tramways, be engaged to advise upon the tramways undertaking at a fee of 110 guineas with out-of-pocket expenses.

Alderman J. Jones, chairman of the Tramways Committee, moved their recommendations, which, he thought, would give Mr. Fearnley a free and unbiased hand.

Mr. Hart Davies, in seconding, said the cost might be criticised as being high, but they wanted the best advice, which was cheapest in the long run.

Mr. H. F. Brown asked whether Mr. Fearnley was an engineer, and whether he was biased in favour of tramways or motor omnibuses. He would like to know what evidence there was that Mr. Fearnley had an open mind.

Alderman Jones said Mr. Fearnley had omnibuses, tramways and railless conveyances in Sheffield and district. One of the reasons they selected him was because he had an open mind, and was likely to give an unbiased opinion from practical experience. He had had experience in all those different systems, and was looked upon in the tramway world as one of the greatest authorities.

The Town Clerk read the letter which had been addressed to Mr. Fearnley. In this it was mentioned that the extent of the Chester tramways was only 3·6 miles, while the portion it was proposed to abolish was 1·4 miles.

Mr. H. F. Brown pointed out that the letter did not ask Mr. Fearnley to report upon the question whether the privilege to run motor omnibuses or tramways in the city should not be leased to an outside firm. The speaker maintained that Chester itself did not form a sufficiently large area for a profitable system of either tramways of motor omnibuses. He thought attention should have been called to that point, and moved that it be added. Mr. A. Wall seconded.

Alderman D. L. Hewitt, supporting the Tramway Committee's recommendation, said they were about to try a dual system of tramways and omnibuses, and the committee wisely came to the conclusion to get an expert's advice. They were asking the Council to expend anything from £50,000 to £100,000 upon the system which might prove a failure. There were two names submitted to the Committee. He happened to know Mr. Fearnley, who was an ideal man for the purpose.

Alderman Jones said that Chester, per car mile, stood very favourably with similar undertakings in the country in their takings. At present they had £20,000 as reserve.

Mr. Matthewson said in common fairness it must be said that when the Corporation took over the tramways they had a loss of nearly £10,000 on the purchase and re-sale of horses and track. He did not think that there was the remotest possibility of an expert deciding that the railless system could be run to better advantage by a private company than it could by the Corporation. He agreed that if the Council decided to agree to hand over the system to a private firm they would make themselves the laughing stock of the country.

Mr. Brown's amendment that Mr. Fearnley's opinion be also sought as to the taking over of the tramways by a private company was approved and the Committee's recommendations then carried.

Electrification of St. Gothard Railway.—Progress in the electrification of the Saint Gothard Railway is reported to be satisfactory, and it is hoped that the Bellizona-Lugano-Chiasso section and the double line between Giubasco and Sasso will be in working order by October, says the *Times*. By the end of the year the Erstfeld-Aarth-Goldau and the Aarth-Goldau-Chiasso sections are expected to be electrified.

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ENGLISH ELECTRIC COMPANY.

REVIEW OF YEAR'S PROGRESS.

The first annual meeting of the English Electric Company, Limited, was held in London on April 27, Sir Charles Ellis, C.B.E., K.C.B. (chairman of the company) presiding. The chairman, in moving the adoption of the report (a summary of which is given below), said during the year their principal task had been that of consolidating the organisation, and satisfactory progress had been made in adapting the Coventry works and restoring the other fixed factories to their normal activities. At Coventry they manufactured large turbine electric units, rolling mill equipments, and the larger classes of engineering products. Preston, which had long been well known for traction work, now specialised even more completely in that branch, and electric locomotives were being made there, in addition to all forms of electric traction equipment. At Rugby and Stafford there had been further development of the medium sizes of steam turbines and electrical machinery. Bradford, which was specially laid out for smaller industrial motors, had now its own machine moulding plant.

Alluding to railway electrification, Sir Charles said this was delayed in the United Kingdom by difficulties of finance, but the technical advantages were not in dispute. The company's contract with the New Zealand Government for the electrification of the Arthur's Pass section of the Midland Railway was proceeding satisfactorily. In pursuance of the policy of economy in selling expenses, the working agreement with Siemens Brothers and Company, Limited, had been followed by the formation of the English Electric and Siemens Supplies, Limited, which would deal exclusively with the marketing of the minor products of the two concerns and electrical supplies generally. With regard to the Labour situation, the chairman spoke of the loss of British contracts in world competition caused by high wages, and said if we were to extend or fully regain pre-war business considerable reductions would be necessary in the price of materials and therefore in the cost of the whole range of processes.

FINANCIAL POSITION.

The report of the directors for the year ended December 31, 1920, states that after writing down stocks on a conservative basis to correspond with present day values, the balance to the credit of profit and loss account (including £45,301 13s. 8d. brought forward from last year) is £312,237 12s. 7d. After deducting debenture interest and trustees' fees (£54,275), interest and discount (£84,608), dividend at the rate of 6 per cent. per annum to December 31, 1920, on the preference shares (£41,914), there is a balance of £131,440 13s. 7d. The dividend on the ordinary shares at the rate of 8 per cent. per annum, less tax, requires £85,204, and a balance of £46,236 is carried forward. The report states that certain dividends receivable from subsidiary companies (including the realised profit on the sale of certain assets) have been in part applied in writing off the entire expenses of, and discount on, the recent note issue, and in reserving for the whole of the premium due on repayment, and in adding a further £25,000 to the capital reserve account. In view of the uncertainties of the present day position of trade throughout the world, the directors have considered it prudent to utilise these resources in the manner indicated, which is in close accord with their policy last year.

Further progress in completing the amalgamation of the various undertakings controlled by the company has been made during the past year. The properties of the Coventry Ordnance Works, Limited, and Willans and Robinson, Limited, have been leased to the company, and arrangements are now in progress for winding up the Phœnix Dynamo Manufacturing Company, Limited, and the United Electric Car Company, Limited. The directors are confident that this consolidation will facilitate control, and result in effecting greater economy in administration.

The directors expressed their regret at the loss of their colleague, Mr. Walter Rutherford, who since the close of the year had retired from the board and the management of the company. At the annual meeting referred to above, Mr. Robt Grant, jun., who joined the board in the year under review, was re-elected a director.

New Omnibus Powers for Wigan.—The Local Legislation Committee of the House of Commons have approved clauses in the Wigan Corporation Bill empowering the municipal authority to run omnibuses, connecting with the existing borough tramways, in the areas of surrounding local authorities. The Corporation were also empowered, by small new lengths of tramways, to make connections with their existing service within the borough which would effect a saving of £1,000 a year. It was stated that up to 1920 the tramways and omnibus service paid, but that there was for that year a loss of £21,000. The Corporation therefore asked power to increase by 100 per cent. the maximum permissible fares. The cost of the tramway additions will be £8,850, and it is proposed to buy ten new omnibuses at £2,000 each.

FINANCIAL REPORTS AND MEETINGS.

DENNIS BROTHERS, LIMITED, declared an interim dividend at the rate of 6 per cent. per annum, less tax.

MEXBOROUGH AND SWINTON TRAMWAYS COMPANY have declared a dividend for the year of 2½ per cent., free of tax; £1,000 has been placed to reserve and renewals account, and £593 is carried forward.

BARSI LIGHT RAILWAY.—An interim dividend of 3 per cent., together with a bonus of 2 per cent. (10s. per share in all), in respect of the year ending March 31, payable on April 22, has been declared.

LOSS ON LIVERPOOL TRAMWAYS.—The first quarter's working of the Liverpool Corporation Tramways resulted in a loss of £70,000, notwithstanding the beneficial effect on revenue of the revised fares, which have been in force part of the time. For the corresponding quarter of last year there was a credit balance of £10,000.

ISLE OF THANET ELECTRIC TRAMWAYS AND LIGHTING COMPANY.—The receipts for the past year were £97,244, and the balance at the credit of revenue account, £24,797. It is proposed to increase the general reserve by £2,500, bringing it up to £15,000, to add £10,000 to the permanent way reserve, making this fund £30,000, and to carry forward £4,824.

RHONDDA TRAMWAYS COMPANY.—It is proposed to convert the 6 per cent. cumulative preference shares of the Rhondda Tramways Company into 8 per cent. non-cumulative participating preference shares with a 25 per cent. participation in the surplus divisible profits, the arrears of dividend being waived as consideration for the suggested alteration.

LONDON UNITED TRAMWAYS, LIMITED.—The gross receipts for 1920 totalled £532,742, an increase of £36,200. Working expenses were £482,597. The balance on working was £50,144, compared with a deficit for the previous year of £144. After charging debenture and loan interest there is £695 as a deduction from the deficit for the years 1918 and 1919.

RHONDDA TRAMWAYS COMPANY, LIMITED.—The accounts for 1920 show £14,000 placed to reserve and renewals account, making £58,000. A loss of £1,051 was incurred on the operation of motor omnibuses, while £39,404 was spent on repairs and maintenance. £1,725 is carried forward. Dividend is announced as 8 per cent., less tax, on preference shares, being 2 per cent. balance for 1915, and 6 per cent. on account of 1916.

KEIGHLEY CORPORATION TRAMWAYS.—The preliminary financial report for the year ending March 31 last shows that the receipts on the tramways amounted to £18,295, an increase of £1,231 over the previous year. Passengers carried numbered 4,307,066—262,459 more than the year before. On the railless cars the receipts were £3,325, as against £2,298 in the previous year, while the passengers increased by 50,097, the total being 280,157.

BURY CORPORATION TRAMWAYS.—For the year ended March 31 the loss on Bury Corporation Tramways was £13,470. The traffic receipts were £131,712, an increase of £8,921 on the previous year. There was an increase of £12,552 in wages and war bonuses, the total being £63,976. The general manager (Mr. F. Buckley) points out that the wages for the year were equal to 48.40 per cent. of the revenue earned, against 26.44 per cent. for the year ending March 31, 1914.

SOUTH METROPOLITAN ELECTRIC TRAMWAYS AND LIGHTING COMPANY, LIMITED.—The report for 1920 shows that the revenue amounted to £140,287. After deducting all expenses, including debenture interest and setting aside £10,500 to renewals fund, there remains £15,756, plus £1,507 brought in, making £17,264. The directors propose placing to debenture stock sinking fund £1,910, dividend on the ordinary shares at the rate of 2 per cent. per annum, carrying forward £1,556. Gross receipts from tramways and light railways amounted to £102,631, compared with £86,644 in 1919.

METROPOLITAN ELECTRIC TRAMWAYS, LIMITED.—The revenue for 1920, apart from dividends receivable, amounted to £957,555. Deducting all expenses chargeable to revenue, including debenture and loan interest, and setting aside £10,000 for reconstruction and renewals, there remains £8,424, plus dividend receivable on the holding in the North Metropolitan Electric Power Supply Company, and the sum brought forward, making available £37,406. The directors recommended placing to reserve £10,868. They also recommended as a dividend on preference shares the balance of 4½ per cent. per annum for 1918, and ½ per cent. per annum on account of 1919, carrying forward £1,538.

JOHNSON AND PHILLIPS, LIMITED.—The profit for 1920, after providing for bad and doubtful debts and charging upwards of £23,000 for maintenance of buildings, plant, etc., was £98,405, plus £32,658 brought in, making £131,063, less directors', auditors', and trustees' fees £1,511, interest on debenture stock £3,657, reserve re debenture sinking fund £9,227, interest on second debentures £2,500, depreciation on machinery and plant, etc., £12,235, interest on loans £4,450, income-tax and excess profits duty £24,312, loss on sale of 4 per cent. funding loan £2,776, leaving £70,394. The directors

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recommend dividend at the rate of 12½ per cent. per annum, less tax, on ordinary shares, carrying forward, subject to excess profits duty for 1920 and Corporation tax, £32,113.

STRAKER-SQUIRE DIFFICULTIES.—The petition of S. Smith and Sons (Motor Accessories), Limited, for the compulsory liquidation of Straker-Squire, Limited, came before Mr. Justice P. O. Lawrence, in the Companies Winding-up Court on April 19. Mr. Luxmoore, K.C., stated that a scheme of arrangement had been submitted to two meetings of creditors, and would be brought before the Court for approval. It was necessary to hold further meetings to sanction the reduction of the company's capital, and he asked for an adjournment for six weeks. Sir Arthur Whinney, special manager of Straker-Squire, Limited, stated that apart from the proposed reduction of capital, which had not come before him, the creditors had accepted the scheme. His lordship adjourned the petition for six weeks.

BRUSH ELECTRICAL ENGINEERING COMPANY, LIMITED.—The accounts for the year ended December 31, 1920, show a net profit of £191,096, to which must be added £74,726 brought in from 1919, making a disposable total of £265,822; £13,000 is placed to depreciation account; the expenses of the new issue of ordinary shares made in 1920, amounting to £15,576, are written off; £2,044, being a further 4 per cent. for the year, is paid to the 6 per cent. second prior lien debenture holders; £53,377 is added to general reserve, raising this account to £75,000. A dividend of 15 per cent. per annum on the ordinary shares, absorbing £38,557, is recommended, leaving a balance of £143,268 to be carried forward, subject to excess profits duty, income and Corporation profits taxes, and directors' additional remuneration.

MANCHESTER TRAMWAYS ESTIMATES.—Manchester Corporation Tramways Committee met on April 19 and considered estimates for the coming financial year. It was reported that the receipts from passenger traffic last year were £1,802,280, as compared with an estimated total of £1,978,530. It is anticipated that £2,038,000 will be spent on the revenue account during the next financial year, as against £1,811,635 for the year just ending. Most of the estimates show an increase.

	Estimate 1921-22		Approximate Expenditure 1920-21
	£		£
Traffic expenses	815,420	...	799,960
General expenses	221,660	...	180,788
Repairs and Maintenance ...	332,500	...	319,796
Renewals Fund	217,820	...	105,861

Purchase of cars and rolling stock is estimated to cost £160,000; buildings, £60,000; and work on the permanent way, £25,000. Authority will be sought to borrow £54,000 for extension of the general offices in Piccadilly.

NORTH METROPOLITAN ELECTRIC POWER COMPANY.—The annual meeting was held on April 27. Mr. E. Garcke (the chairman) presided, and in moving the adoption of the report and accounts, said the net revenue of the company for the past year had reached a record figure, and the result would have been even better had it not been for the depression in trade. The net revenue, including interest and dividends received, was £101,354, compared with £65,868 for 1919. After meeting prior charges and placing £16,000 to reserve account (raising the reserve to £130,000), the directors recommended the payment of the dividend on the 6 per cent. preference shares and a dividend on the ordinary shares at the rate of 7½ per cent. for the year, compared with 4½ per cent. for the preceding year, leaving £4,433 to be carried forward, or £2,400 more than the amount brought into the account from the preceding year. The chairman mentioned that the company had increased its authorised share capital by £500,000 to £1,500,000.

METROPOLITAN-VICKERS ELECTRICAL COMPANY, LIMITED.—Mr. J. Annan Bryce, who presided at the meeting of the Metropolitan-Vickers Electrical Company gave an interesting review of current industrial and monetary problems. He emphatically repudiated the suggestion that employers were endeavouring to force wages down to the pre-war level irrespective of the cost of living. The record of the company in 1920 was encouraging. The orders received during last year were in value 80 per cent. greater than those in 1919, while the value of the completed orders was about 50 per cent. greater. According to the annual report, the net profit for 1920 was £308,490 (against £225,260 in 1919), and to this is added £51,089 brought forward. It is proposed to set aside for special depreciation of plant, etc., £35,000 (the same as in 1919), £100,000 (the same) is placed to general reserve, and the directors recommend a dividend on the ordinary shares of 12½ per cent., less tax (as compared with 8 per cent.), leaving to be carried forward £58,824. During the year 32,866 preference shares have been converted into 65,732 ordinary shares. The total conversions to December 31 last amount to 42,952 preference shares into 85,904 ordinary shares.

MADRAS ELECTRIC TRAMWAYS, LIMITED.—The directors' report for the year ended December 31, 1920, shows a gross profit of £41,103. After charging interest and London office expenses, and making provision for debenture stock sinking fund, and transferring £15,000 to depreciation and renewal account, there is a balance of £15,692, or, including the sum brought forward from last year of £4,944, there is a total of £20,636. Dividends on the preference shares require £6,000, and the interim dividend of 4 per cent. on the ordinary shares, £2,290, leaving a balance of £12,346. The directors now recommend a further dividend of 4 per cent. on the ordinary shares, making 8 per cent. for the year, free of income-tax (£2,290); contribution to the employees' gratuity fund, £1,000, and the transfer to general reserve fund of £3,500, leaving a sum of £5,555 to be carried forward, subject to excess profits duty (if any). The traffic receipts and running expenses show increases over 1919 of 16·6 per cent. and 24·4 per cent. respectively. In comparing the figures with those of the previous year, regard must be had to the par value of the rupee, which was 2s. in 1920, instead of 1s. 4d. as formerly.

LONDON AND SUBURBAN TRACTION COMPANY.—The ordinary general meeting of the London and Suburban Traction Company, Limited, was held on May 5 at Electric Railway House, Westminster, Lord Ashfield (the chairman) presiding. The chairman said the company had not had a successful year; in fact, he thought almost without exception tramways throughout the country reached a condition some months ago in which they became unremunerative. After referring to the deficit on the London County Council system, Lord Ashfield said the other municipally-owned tramways in the London area were in even worse plight. "The result cannot be attributed to any neglect or incapacity in the management," he proceeded, "but wholly to the fact that while all payments for labour, services, and commodities have moved upwards with the rise in economic levels occasioned by the war, fares receipts have until quite recently, by the dead hand of the maximum powers legislation, been held almost at the old level." The results for the year were an improvement on those for the preceding year, and bore possibilities of much further improvement. In 1918 the tramways carried 198 millions of passengers; in 1919, 208 millions; and in 1920, 207 millions. If it had not been for the falling off in passengers on the London United Tramways, 1920 would have shown an advance on 1919. The traffic receipts of 1919 were £1,370,000; and in 1920, £1,566,000, representing a growth in the last two years of 48 per cent. In the same period expenses only increased 46 per cent., so that there was a slight gain in net receipts. Now that expenses were once more falling, the tendency shown in these figures would become much more marked, and the results much more satisfactory. Referring to the working of the Tramways (M.E.T.) Omnibus Company and the Gearless Motor Omnibus Company, worked and managed as part of the L.G.O.C. (in both of which the Traction Company is interested), Lord Ashfield said that since the increase of fares last September, the omnibus undertakings had been worked at a profit.

BATH ELECTRIC TRAMWAYS.—Mr. J. B. Hamilton, C.B.E., chairman, presiding at the annual meeting of the Bath Electric Tramways, Limited, said that during the past year various increases in wages had been forced upon them, and a further demand for 12s. per week was put forward just before the end of the year. This demand was refused by all the tramways, whether operated by municipalities or by companies. There was an inquiry by a court appointed by the Ministry of Labour, by which a kind of recommendation was made that present wages should be maintained until the end of the now current year. Whether or not any steps would be taken to give effect to this recommendation—for it was nothing but a recommendation—he was not yet able to say. In resisting and refusing to accept this latest demand for an increase in wages at a time when the cost of living was decreasing, he thought the tramways had done good to the country; for it was inevitable that if business was to continue, all costs would have to be reduced, and incidentally as the cost of living came down wages must also come down. In consequence of an increase in the company's fares their traffic receipts had increased, but not sufficiently to offset the extra cost of wages and material. In spite of the reported falling off in the price of various commodities, the cost of materials was still exceedingly high. Their fuel alone in the past year had cost over 24 per cent. more than in the previous year. Some time since they had adapted their furnaces at the power-station so as to burn a lower grade of fuel than previously, and he thought they were working at a very economical fuel cost. Last summer it was decided to transfer the motor business and foundry to a separate company, called the Bath Tramways Motor Company, Limited. The accounts of the motor company were now made up, and a dividend would shortly be paid. The tramway company would, of course, benefit from its shareholding in the motor company. It was exceedingly difficult to make any forecast as to the future in any public utility concern. All industries depended upon the return to sanity of those who by their action seemed to be doing everything possible to prejudice not only the country and its trade but themselves.

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TRAMWAY AND LIGHT RAILWAY NOTES.

ABERDEEN.

CORPORATION AND COMPANY DISPUTE SETTLED.

The disagreement between Aberdeen Corporation and the Aberdeen Suburban Tramways Company respecting the annual sum payable by the Corporation to the company has been settled. Mr. C. D. Stanley, of the Ministry of Transport, visited the town and interviewed the respective parties, and the agreement was reached at an adjourned conference in the Town House. The point at issue arose over the fact that the tramways company, though it received a yearly payment from the Corporation in lieu of men's wages, at a rate equal to that at which the municipal employees are paid, did not distribute wages at as high a rate, putting the residue to general maintenance account. The municipal authorities insisted that if the company paid this lower rate the Corporation would only pay a sum corresponding to it, but the company declined to accept this, holding that their men were receiving a proper wage according to their grade. The Corporation thereupon decided to terminate, in June next, the agreement by which the company's cars used the Corporation lines. As the agreement arrived at involves considerable detail yet to be worked out, the ratification may take some time.

BRADFORD.

RAILLESS CARS—TRACK RECONSTRUCTION.

The Tramways Committee has asked for an estimate of the cost of providing the necessary cars of the new single-deck railless type, designed by the general manager (Mr. R. H. Wilkinson). It will be remembered that these "one-man" cars, as previously described in these columns, have been sanctioned by the Ministry of Transport for use on Bradford's existing railless trolley system. The committee has also asked for information concerning the expenses of petrol motor omnibuses. The Tramways Committee have further recommended that in the next Bill promoted in Parliament by the Corporation powers should be sought for the construction and operation of double-deck, top covered, railless trolley vehicles of the four-wheeled type, illustrated elsewhere in this issue, weighing not less than 7 tons 10 cwt., and of a six-wheeled type, weighing not less than 9 tons 10 cwt. (unladen weight in both cases). The Bolton Road track of Corporation tramways from Wapping Road to Lister Lane is to be reconstructed at a cost of £35,700. It will be recalled that the Minister of Transport declined to sanction the running of railless trolley vehicles on this route, which serves Idle, Eccleshill, and Thackley.

CARDIFF.

WAGE INCREASE REFUSED.

The Corporation Tramways Committee received a deputation from the employees of the tramways department, who asked that the wages paid to the men should be raised to the same level as those paid in other Corporation departments. It was stated that labourers employed by the Corporation received 1s. 10d. and 1s. 11d. per hour, whereas the rates paid to conductors and drivers were 1s. 6d. and 1s. 7½d. per hour respectively. The chairman (Mr. Sydney Jenkins) pointed out that last year the tramways department lost £7,000, largely through strikes. Mr. A. J. Attwell, one of the deputation's spokesmen, replied that the undertaking had a reserve of £20,000, and that the men lost most by the strikes. After three councillors had voiced strong support of the men's case, the chairman said the Industrial Council had decided that the present rates should remain in force until December 31 next. The tramways manager (Mr. R. L. Horsfield) said an increase of ½d. an hour would mean at least £5,000 a year. Councillor E. Curran stated that the committee could not make any alteration unless they withdrew from the Industrial Council. The committee concurred in this view, and the application was refused.

DURHAM.

TRANSPORT BILL REJECTED.

The Durham County Transport Bill, a private measure, empowering Durham County Council to construct tramways and run omnibuses, was rejected by 112 votes to 46 in the House of Commons, without being granted a second reading. Petitions in opposition to the Bill had been promoted by various local authorities in the county concerned, and the measure was also opposed by Members from other parts of the country, on the ground, apparently, that a principle of general importance was involved.

The Member for the Hartlepools, Mr. W. G. Howard Gritten, in presenting a petition from the Borough of Hartlepool, said the signatories maintained that transport facilities were already provided between Hartlepool and West Hartlepool, and through to the neighbouring industrial area; that they were provided by tramcars belonging to the Hartlepool Tramways Company, and the municipal tramcars of West Hartlepool. With regard to Hartlepool, there was no road traffic between the borough and the remainder of the administrative county sufficient to justify the County Council running omnibuses into the borough. Mr. Neal, Parliamentary Secretary to the Ministry of Transport, said the Government were of opinion that this was a case in which the House should be left to express a free and unfettered judgment.

EDINBURGH.

ELECTRIFICATION TO BE COMMENCED.

The Town Council decided at its meeting on April 13 to adopt the recommendation of the Tramways Committee that estimates be obtained for the electrification of the first section of the cable system, from Pilrig to Liberton, as proposed by the general manager (Mr. R. S. Pilcher) in a report which is given in this issue. Mr. W. R. Sleigh, convener of the Tramways Committee, moved the adoption of the recommendation, and explained that in February 1919 they decided to convert the cable system to electric traction, and that Pilrig to Liberton should be the first section converted. In case they thought the time was not opportune for incurring capital expenditure to the extent of £182,000 he should state that, while this expenditure would increase the annual standing charges to the extent of 2·5d. per mile, this increase would be more than provided for on this section by the reduction of the working expenses under the different form of traction. The system could pay its way with receipts at 20d. a mile, and the Edinburgh cable receipts were as high as 25d. per mile. The difference was ample to provide for the 2.5d. per mile for interest and sinking fund. Bailie Robertson seconded, and said the Council had already committed themselves to the policy of electrifying the system in Edinburgh, with the exception of Princes Street, which was specially reserved. The Tramway Committee's policy was to proceed with the scheme in sections. Some criticism of the scheme was expressed in the subsequent discussion, but the proposal to proceed with the work was carried, as stated.

KEIGHLEY.

RAILLESS CAR SERVICE REVIVED.

The railless trolley car service of the Corporation, after having been more or less in abeyance for some time, has now been resumed on a regular basis over the Oxenhope route. The resumption of the Oakworth route, on account of its hilly nature, presents much difficulty. The gradient in one or two places is as much as 1 in 10, and has evidently occasioned considerable strain on the vehicles in the past. The system in use is the overrunning type, the trolley being supported by the trolley wires. The cars are of the Austrian Mercedes-Stoll type, the motor being fixed in the wheel with revolving armature and fixed field (keyed to the axle).

LEEDS.

NEW ROAD AND TRAMWAY SCHEME—PROPOSED INCREASED FARES.

The scheme of road and tramway reorganisation which has been commenced at Leeds with the object of improving communication between the centre of the city and the rapidly developing suburban housing sites is making steady progress. In addition to new or widened roads radiating from the heart of the city, express tramway routes and a "ring road" linking up the suburbs are proposed, interesting details of which have been given by the *Yorkshire Post*. On the south side of the city work is proceeding on the tramway track to the Middleton housing area, while in Roundhay Road much headway has been made with the widening required for the laying of a separate tramway track. The Roundhay and Middleton express routes are the first of a series entailing special construction. In Roundhay Road, from Harehills to Oakwood, and probably thence along a widened Prince's Avenue to the Park entrance, the tramway lines are to be laid off the present roadway for purposes of rapid transit, while in the case of Middleton the new line will be laid independently of roads for the greater part of its length. Generally speaking, however, the design approved provides for wide roads with central tramway tracks fenced off from the rest of the roadway. By this means it is hoped to ensure not only rapid transit but economy in first cost and maintenance, and at the same time to reduce the noise of traffic and obviate the hindrance to ordinary traffic when lines have to be repaired. In this connection may be noted a proposed new stretch from Harehills to the Wetherby Road, a new length of York Road, with a shortening of the approach to Cross Gates, and the widening of roads on the south. Bradford Corporation, it is mentioned, also propose to construct a ring road in and around their area, and this would link up with the Leeds circular road in the Farsley district, at the same time relieving the present congestion of traffic between the two cities. Leeds Corporation have decided to apply to the Ministry of Transport for power to increase the maximum tramway fares from 1d. to 2d. per mile.

LIVERPOOL.

MINIMUM TWOPENNY FARE ADVOCATED.

An application to impose a minimum fare of 2d. on the Corporation Tramways was heard by the Light Railways Committee of the Ministry of Transport in London on April 26. Mr. H. A. Steward presided. Mr. E. W. Pierce, Deputy Town Clerk, said the Corporation owned about 127 miles of track, of which about 8½ miles

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were in the borough of Bootle and 3½ miles outside the Liverpool borough in the neighbourhood of Prescot. He pointed out that there was an inevitable deficit in the working of the tramways owing to the present scale of fares, and said the estimated deficit for the current year amounted to £186,000. He suggested that a minimum fare of 2d. would not be a startling increase nowadays, and said the average fare was now 2d. for every 2¾ miles. With regard to the Bootle section of the system, the application was objected to, but statutory arrangements made it binding upon the Liverpool Corporation to operate the Bootle section on the same terms as the Liverpool part of the system. Mr. P. Priestly, general manager of the tramways, said that bad trade had undoubtedly affected the income from the undertaking. In reply to a question by the chairman as to how they expected to make up the deficit, Mr. Priestly said it was hoped wages might fall and that the cost of materials would be reduced. The estimate for renewals was about £300,000 in the present year. Track renewals were greatly in arrears due to the war, and the rolling stock was also bad. Mr. F. Wilson, chairman of the Tramways Committee, said they had spent about £260,000 on renewals in recent years. Mr. J. Spencer Tumilty, Town Clerk of Bootle, opposed the application, and urged that Liverpool had gained from tramways extension in the matter of the increased rateable value of surrounding property. Alderman J. Booth, chairman of the Bootle Tramways Committee, and Mr. J. Gronow (the Bootle treasurer), gave evidence in support of counter proposals advocating five stages in Bootle at penny fares.

LONDON.

TRAMWAYS DEFICIT—JUNCTION LINES—TRAFFIC AUTHORITY.

It was disclosed at the monthly meeting of the County Council on April 19 that there will be a deficit on the tramway undertaking of £540,480 for the last financial year. The Highways Committee reported that during the period from April 1, 1920, to March 31, 1921, the approximate total expenditure, including debt charges and half cost of renewals, based on annual, supplemental, and special estimates, was £5,464,339, while the aggregate traffic receipts during the same period were only £4,794,657, subject to adjustments under through running agreements, leaving an approximate deficit during the twelve months of £669,682. Taking into account receipts from other sources, such as advertisements, rents of lines worked under agreements, etc., it is estimated that this deficit will be reduced to £540,484. In connection with the construction of the tramways on the route from the West India Docks to Mare Street, the Highways Committee reported that they had considered the question of a junction line from Mare Street to Graham Road, which would connect up the service on the new lines with the existing service. The Hackney Metropolitan Borough Council had consented to the installation of the junction line, and this would be constructed under Section 12 of the London County Council Tramways and Improvements Act, 1901. The cost is estimated at £6,300, and the Finance Committee submitted the amount as chargeable to capital (25 years) account.

NEWCASTLE-ON-TYNE.

TRAMWAY EXTENSION OPENED—GROWTH OF NEWCASTLE TRAMWAYS.

The scheme of tramway extensions decided upon by Newcastle Corporation in 1914 has been completed, and the new routes to West Moor and Forest Hall opened. Members of the City Council and representatives of the Longbenton and Gosforth Urban Councils attended the inauguration ceremony on the invitation of the chairman of the Transport and Electricity Committee (Alderman R. Mayne), the vice-chairman (Sir Arthur Sutherland), and the members. The new line commences at Pilgrim Street and runs *via* Byker Bridge and Chillingham Road. By walking through Gosforth Park passengers can conveniently return to the city on the cars from the west gates. The round journey occupies from one and a half to two hours. Corporation omnibuses for Cramlington and Earsdon leave Gosforth Park corner each hour, connecting with the new car service. During the last decade, according to the chairman, the number of cars on the Newcastle system has increased from 168 to 228, the number of passengers carried from 45 millions to 98 millions, receipts from £206,000 to £570,000, expenses from £114,000 to £493,000, and the number of employees from 862 to 1,711. Up to the year 1911 the amount contributed directly to the rates was £19,730; it was now £159,000, and they had paid £105,000 to the National Exchequer.

WIGAN.

NO RAILLESS TROLLEY CARS.

The General Purposes Committee of the Town Council has decided to withdraw from the Corporation Parliamentary Bill the clause seeking power to convert the Aspull and Martland Mill tramway routes into the railless trolley system. A report on the proposed conversion was prepared by Mr. J. B. Hamilton, of Leeds, in December last, but it has now been decided that the more economical course would be to reconstruct the present tramway tracks on the routes in question.

LONDON UNDERGROUND RAILWAYS.

Supplementing the article in last month's issue on the new scheme of organisation of the London Underground Group, we reproduce below additional portraits of principal officers:

Mr. C. J. Spencer
(*General Manager, Tramways*)

Mr. A. L. Barber
(*Commercial Manager*)

Mr. C. S. Louch
(*Comptroller and Accountant*)

Mr. J. P. Thomas
(*Operating Manager, Railways*)

Mr. H. E. Blain, C.B.E., Assistant Managing Director of the Underground Group of Companies, has been retained by the Transportation Commission of Toronto to advise that important Canadian city on its transportation problems, and sailed for New York in the *Adriatic* on May 18. After he has completed his report for Toronto, Mr. Blain will be joined by **Mr. C. S. Louch,** comptroller and accountant, and **Mr. J. L. B. Lindsay,** assistant secretary and treasurer of the Underground Group, and the party will then make a tour of many of the important cities of the United States to study their transportation methods.

PERSONAL.

Mr. J. Wood, chief traffic clerk, has been promoted to be chief traffic assistant of the Liverpool Corporation Tramways, at a salary of £500 a year.

Mr. Horace I. Palmer, chief traffic assistant, has been appointed traffic superintendent of the Liverpool Corporation Tramways, at a salary of £650 a year.

Mr. J. W. Meares, M.Inst.C.E., M.I.E.E., electrical adviser to the Government of India, has been appointed chief engineer of the Hydro-Electric Survey of India, in succession to Mr. F. E. Bull, who has retired.

Sir Francis H. Barker has been appointed vice-chairman of the Metropolitan-Vickers Electrical Company, Limited, in place of Mr. E. V. Hiley, who has resigned. Sir Vincent Caillard has been appointed to the vacant seat on the board of the company.

Mr. Albert Mitchell, a late member of Stockton Town Council, has been appointed works foreman of that portion of the Tees-side tramways recently taken over by the Council (in conjunction with the Middlesbrough Council), from the Imperial Tramways Company, Limited.

Mr. R. McGregor, chief mechanical engineer of Messrs. J. G. White and Company, has resigned this position to become engineer of Clayton and Shuttleworth, Limited, Lincoln. That firm recently produced a new design of boiler which it is claimed represents a marked advance on existing construction, and Mr. McGregor will be largely responsible for the development of this branch of the business.

Mr. J. A. Crowther, borough electrical engineer of Wallasey, has stated to the Electricity Committee his desire to retire from that position on July 31 next. The committee, in accepting his resignation, have expressed their appreciation of Mr. Crowther's services, and they recommend the Council to pay to him his full salary to September 30, and thereafter a superannuation allowance of £475 per annum, and in addition a retaining fee of 100 guineas for two years.

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CONTRACTS AND ORDERS.

Hadfields, Limited, have received an order for crossings, points and tongues for Ilford tramways department.

Rotherham Tramways Committee has accepted a tender for 200 tons of acid bessemer rails from Steel, Peech and Tozer, Limited, at £27 15s. per ton.

The Peckham Truck and Engineering Company, Limited, have received an order from Southend Light Railway Committee for four steel truck sides at £24 each.

Bristol Tramways and Carriage Company, Limited, has received an order from Middlesbrough Corporation for two omnibuses at a cost not to exceed £2,000 each.

Middlesbrough Corporation has accepted the tender of the Tees-side Bridge and Engineering Company, Limited, for the erection of a steel frame car depot, amounting to £4,300.

Glasgow Tramways Committee have accepted the tender of Ferguson, Pailin, Limited, at £7,444 for the supply and fixing of switchboards for Buchanan Street and Cadogan Street sub-stations.

Sheffield Tramways Committee have recommended the acceptance of the offer of Steel, Peech and Tozer for 200 tons of rails (the balance of a contract for 1,000 tons) at the rate of £32 per ton.

The English Electric Company, Limited, are to supply a 10,000 kw. generator for Aylestone electricity station, Leicester, at £187,300. The condenser required will be supplied by W. H. Allen and Company at £91,384.

Bolton Tramways Committee have considered tenders for the supply of tram rails and fishplates, and have recommended that of Walter Scott, Limited, Leeds, for 400 tons of tramrails and 10 tons of fishplates.

Reading Tramways Committee have accepted the tender of H. Lotery and Company, Limited, of 4-8, St. Mary Street, London, E.1, for the supply of uniforms, caps, overcoats, and waterproofs for the tramways staff.

Manchester Electricity Committee have accepted the following tenders—Cables, Pirelli-General Cable Works, Southampton, and W. T. Henley's Telegraph Works Company, and for switchgear, Bertram Thomas, Manchester.

Salford Tramways Committee recommend acceptance of the tender of the London Electric Wire Company and Smith's, Limited, Salford, for 2½ miles of round copper trolley wire, at 11$\frac{1}{16}$d. per lb., amounting approximately to £294.

The Western Electric Company, Limited, were the successful tenderers to the London County Council for the supply of low tension cables required in connection with the construction of the tramways from West India Docks to Mare Street.

London County Council Stores Committee have accepted tenders for electric lamps from the English Electric and Siemens Supplies, Limited (£8,505), Stella Lamp Company Limited (£432), and British Union Lamp Works, Limited (£366).

Rochdale Corporation have ordered steel tires from Belgium at £25 5s. a ton. It is estimated that, after adding freight charges, a saving will be effected of £17 10s. a ton compared with British tenders. The quotation given in all the latter was the same, viz., £45 a ton.

J. W. Courtenay, Limited, of Amberley House, Norfolk Street, Strand, London, W.C., have been appointed sole advertising contractors for the Stockton and Thornaby Corporations' Joint tramways and for Lincoln Corporation's motor omnibuses in addition to the tramways.

Increased Price of Southend Cars.—At Southend Light Railways Committee a letter was submitted from the Brush Electrical Engineering Company, the contractors for the supply of the 13 new cars, to the effect that owing to the various engineering awards, increased cost of material, etc., the contract price of the cars would, in accordance with the terms of the contract, be increased by £4,293. The amount sanctioned by the Ministry of Transport for the purchase of the cars amounts to £32,700, and it is proposed to apply for further borrowing powers.

BUSINESS NOTICES.

HENLEY'S TYRE AND RUBBER COMPANY, LIMITED, have announced a reduction of 10 per cent. in prices of Henley solid rubber band tires.

AUSTIN MOTOR COMPANY, LIMITED.—Mr. Justice P. O. Lawrence has appointed Sir Arthur Whinney receiver and manager of the Austin Motor Company, Limited. He will carry on the business pending the formation of proposals for the re-organisation of the company's finance.

MUNICIPAL TRAMWAYS ASSOCIATION'S OFFICES.—The headquarters of the Municipal Tramways Association, of which Mr. J. Beckett is general secretary, are now at 5 and 6, Clement's Inn, Strand, London, W.C.2, having been moved from Gothic House, Accrington. The telephone number is Holborn 1653, and the telegraphic address "Munitrams, Phone, London."

INSTITUTE OF TRANSPORT ACTIVITIES.—The March issue of this journal, which as now been published, mentions that it is proposed to hold a congress in London during 1922, at which an effort is to be made to exhibit transport appliances not covered by established exhibitions. Arrangements for the formation of the north-western district of the Institute, covering Cheshire, Lancashire, Westmorland, and Cumberland are approaching completion.

SHREWSBURY-CHALLINER BIRMINGHAM DEPOT.—Messrs. Shrewsbury-Challiner's Solid Tire and Service Depot in Birmingham is now located at 45, Irving Street, Holloway Head, where the more commodious premises are fitted with up-to-date plant for the rapid fitting of tires. The equipment also includes the necessary plant for removing steam wagon wheels. Messrs. Shrewsbury-Challiner have their own service wagon attached to the depot, in order that wheels can be collected and re-delivered.

BRILL STOCK OF TRUCK PARTS.—The J. G. Brill Company, of 150 Southampton Row, London, W.C.1, has issued a useful type of showcard which should prove of practical value to tramway managers and stores superintendents. An illustration of the various Brill castings and springs is accompanied by a diagram of a truck with the corresponding parts clearly indicated. It is suggested that the card may be conveniently mounted behind a sheet of glass and bound at the edges with gummed paper, for hanging in the desired place.

RECENT PUBLICATIONS.

HANDY POCKET MAPS.—The Underground Railway are issuing handy pocket maps for the use of travellers, especially visitors to London. The maps may be obtained on application to the Traffic Advertising Agent at Electric Railway House, Broadway, Westminster, S.W.1.

B.T.H. FABROIL PINIONS.—The British Thomson-Houston Company, Limited, of Rugby, have issued a well-illustrated booklet describing the construction and particular uses of their Fabroil pinions, the advantages of which, it is pointed out, include durability under all conditions, shock-absorbing qualities, and noiseless running.

METROPOLITAN-VICKERS TRANSFORMERS.—We have received from the Metropolitan-Vickers Electrical Company, Limited, Trafford Park, Manchester, a copy of their booklet describing the installation and operation of the firm's power transformers. Illustrated by numerous photographs and diagrams, it forms a serviceable guide to the handling and maintenance of this well-known type of plant.

"ORWELL" ELECTRIC VEHICLES.—Mossay and Company, Limited, of 7 Princes Street, Westminster, S.W., have issued a pictorial brochure of the many types of "Orwell" electric vehicles built by Ransomes, Sims and Jefferies, Limited, of Ipswich, for whom they are selling agents in the United Kingdom. This class of vehicle has been largely adopted for almost every form of commercial and municipal road transport. The running cost of an electric lorry is estimated at 6¾d. per mile.

ALUMINIUM FOR OVERHEAD LINES.—The British Aluminium Company, Limited, has issued pamphlet No. 6 in the series of their "Hints on Aluminium." This covers H.D. wire and strands for overhead lines, and contains particulars of use to the designer and director. The company points out that the world's longest transmission lines are of aluminium, that the use of this metal for overhead transmission lines leads to substantial economy, and that years of service under severe conditions have demonstrated that it is both a reliable and efficient conductor.

STEAM TURBINES.—The English Electric Company, Limited, has issued a well illustrated and finely printed booklet on English electric steam turbines (impulse type). In an introduction a reference is made to the post-war expansion of industry, with the almost universal adoption of the electric drive in the works of manufacturers, thus increasing the urgency of the call for more electricity. To meet this demand and provide suitable units for large power-stations, the English Electric Company has in recent years added to its existing standards the development of turbo-electric units ranging from a capacity of 10,000 KW. to 30,000 KW., thus providing a complete range of standard machines from 250 KW. upwards. The company is prepared to supply either impulse or reaction types of turbines. The pamphlet contains ample descriptions of both types, and there are numerous illustrations which give a very clear idea of the construction of the machines. The pamphlet contains also a plan in colours showing the arrangement of a generating station provided with two 10,000 KW. turbo-alternator sets. A list is also given of generating sets installed in the British Isles and Dominions and abroad, of which both the turbines and generator have been manufactured at some of the company's works.

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PATENT LIST

Abstracted for "The Tramway and Railway World" from the Official Journal of Patents.

***** If the inventions have been communicated the names of the communicators are given in italics.**

APPLICATIONS FOR LETTERS PATENT.

The number of the patent is given in brackets.

Current collecting devices for electrically propelled vehicles (9,921) – British Thomson-Houston Company Limited, and C. McCready.
Speed indicators for motor vehicles (10,039) R. B. Johnsen.
Transmission systems for mechanically propelled vehicles (10,240) – R. Manthorpe and H. Woods.
Spring contact members for electric circuits on motor vehicles (10,249)—E. G. Mottershead.
Indicators for road vehicles (10,447)—C. Pearson.
Mounting for trolley poles (9,881)—V. Spagnuolo and M. Urbinati.
Tramway rail (10,333)—J. A. Yeadon.
Axle boxes and bearings for tramcar wheels (10,833)—T. W. Cooper and Hoffmann Manufacturing Company, Limited.
Direction indicator for motor vehicles (10,712)—T. G. R. Gilbert.
Trolley pole safety appliance for electric tramways (10,705)—P. M. de C. Ireland.
Brake actuated mechanism for motor vehicles (11,002) M. S. Napier.
Trolley head for electric tramcars (11,091)—C. Noble.
Automatic compressed air brake for tramways (10,680)—E. Seguin.
Pneumatic brakes for tramways (10,681)—E. Seguin.
Tramway rails (11,483)—F. Adams.
Slipper trolley heads for electric traction (11,660)—Brecknell, Munro and Rogers, Limited, and H. I. Rogers.
Apparatus for holding fish plates in position when welding rail joints (11,387)—H. Bolton and G. Wallace.
Lifting jack (11,695)—F. A. Ellis.
Change-speed gear for motor vehicles (11,314)—R. C. W. Horsley.
Motor vehicles (11,677)—A. E. Rouvier.
Means for mounting and driving magneto-electric machines on motor vehicles (12,005)—A. M. Allen.
Transmission gear for motor vehicles (12,063)—A. M. Banister, B. M. R. Company, Limited, H. Edmunds, F. A. Grimes and P. J. McCarty.
Means for operating track-sanding apparatus of tramway vehicles (12,344)—G. A. Bradfield, M. F. Keen and G. Stockley.
Life guards for motor vehicles (11,965)—A. W. Bredberg.
Electric switches (12,386)—Bristol Tramways and Carriage Company Limited, and B. A. Payne.
Electric power transmission and braking systems (11,966)—British Thomson-Houston Company, Limited (*General Electric Co.*).
Automatic safe guard for front of motor vehicles (12,128)—E. W. Gilbey and A. G. Spence.
Motor vehicles (12,136)—H. Heal.
Balance for sliding windows of tramcars (11,956)—R. Mariani.
Brakes for motor vehicles (11,832)—F. W. Mead.
Road vehicles (12,334)—Railless, Limited.
Speed controlling devices for tramcars, etc. (12,131)—E. Rodolausse.
Motor vehicles (12,431)—W. Sanders and W. H. White.
Lifting jacks (11,846)—S. J. Watson.

SPECIFICATIONS PUBLISHED

1919.

Temporary conversion of the gauge of a rail vehicle to wider or smaller gauge and the reconversion thereof (29,932—*159,949*)—H. E. Girdlestone and C. B. Mathews.
Fish plates for connecting tramway lines (31,233—*160,241*)—N. Stanyer and L. Preston.
Tramway signalling systems (31,570—*160,267*)—P. H. Waller.
Buffer devices for tramway vehicles (31,677—*160,272*)—S. G. H. Orell.
Pulleys for use with trolley poles of electric tramcars (22,114—*160,478*)—G. A. Bishop and R. A. Chadwick.
Transmission gear for motor propelled vehicles (32,312—*160,567*)—J. S. Wilkerson.
Friction driving gear for motor vehicles (32,421—*160,573* and 32,422—*160,574*)—A. J. Bohringer and W. Digby.
Life guards for motor buses, etc. (27,996—*160,871*)—C. W. Mallins and J. P. Barker.
Lifting jacks (29,981—*160,893*)—F. L. Rapson.
Control lever mechanism for motor vehicles (32,782—*160,939*)—British Transmission Company, Limited, and R. Pentony.

1920.

Driving of self-propelled road vehicles (2,408—*160,051*)—R. W. Hartley.
Automatically and continuously working change-speed gear for motor vehicles (21,656—*160,117*)—J. Aublant.
Automatic control of variable speed gears for self-propelled vehicles (587—*160,315*)—F. A. Oddie.
Lifting jacks (1,433—*160,327*)—A. E. Lake.
Dynamos for use with lighting and starting devices on motor vehicles (5,097—*144,997*)—J.R.P.E.F.M. Grimaud.
Change speed gear for motor vehicles (12,190—*142,808*)—A. Gnudi.
Change speed gears for motor vehicles (17,794—*145,620*)—Daimler Motoren Ges.

1921.

Lifting jacks (40—*160,132* and 41—*160,133*)—A. E. White (*McKiernan-Terry Drill Company*).

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TRAFFIC RETURNS.

Tramway and Omnibus Undertakings in the United Kingdom.

NAME OF COMPANY OR CORPORATION.	1920. WEEKS ENDED April 10	April 17	April 24	May 1		1921. WEEKS ENDED April 9	April 16	April 23	April 30		AGGREGATE. Wks.	1921.	Increase or Decrease.
	£	£	£	£	£	£	£	£	£	£		£	£
Aberdeen Corporation	3,181	3,315	3,196	3,207	...	3,782	3,668	3,461	3,622	...	47½	180,250	+ 27,060
Ayr Corporation	721	530	533	697	...	576	585	584	658	...	50	36,939	+ 3,389
Barrow Corporation	887	723	735	689	...	872	864	793	927	...	4	3,458	+ 323
Belfast City Tramways	13,670	10,927	11,175	11,169	...	14,573	12,953	12,495	13,213	...	4	53,234	+ 6,293
Birkenhead Corporation	2,908	2,904	2,945	2,987	...	2,522	2,554	2,555	2,566	...	4½	11,327	- 1,959
Birkenhead Motor 'Buses	319	248	276	275	...	508	478	529	609	...	4½	2,389	+ 1,097
Birmingham Corporation	28,028	26,944	27,420	28,083	...	30,808	30,689	29,877	31,641	...	4	133,252	+ 11,011
Birmingham Motor 'Buses	2,034	1,781	1,873	1,927	...	2,011	1,965	1,865	2,189	...	4	8,795	+ 395
Blackburn Corporation	3,229	2,099	2,373	2,280	...	2,613	2,550	2,428	2,523	...	4½	12,729	+ 1,252
Bradford Corporation	13,612	12,139	12,013	11,800	...	13,745	14,599	13,518	15,108	...	5	62,327	+ 7,042
Burnley Corporation	3,386	3,377	3,269	3,309	...	3,266	2,946	1,481	1,448	...	—	—	—
Burton-on-Trent Corporation ...	582	580	562	549	...	613	632	586	605	...	4	2,707	+ 220
Bury Corporation	2,419	2,515	2,403	2,422	...	2,485	2,570	2,710	2,878	...	4½	11,944	+ 302
Chatham and District	1,695	1,624	1,602	1,670	...	1,793	1,713	1,525	1,642	...	17	27,754	+ 2,296
Derby Corporation	2,299	2,113	2,093	2,103	...	2,238	2,213	2,214	2,328	...	4	9,974	+ 192
Dundee City	2,610	2,449	2,595	2,547	...	3,301	3,351	3,179	3,358	...	49½	153,088	+ 27,497
East Ham Corporation	1,816	1,647	1,764	1,792	...	2,166	2,157	2,034	2,034	...	4½	9,113	+ 1,571
Edinburgh Corporation	11,372	10,593	11,935	11,039	...	10,923	10,563	11,161	11,826	...	50	581,913	+ 56,054
Edinburgh Motor 'Buses	470	433	544	499	...	3,000	2,938	3,350	3,637	...	50	—	—
Glasgow Corporation	33,267	33,656	34,271	34,530	...	47,551	47,783	46,982	50,000	...	47	2,168,759	+ 606,547
Glossop (Urban Elec. Supply Co.)...	250	235	234	228	...	225	234	219	252	...	18	4,306	+ 174
Halifax Corporation	4,342	3,134	3,634	3,488	...	3,655	3,988	3,950	4,103	...	3½	15,697	+ 1,098
Halifax Motor 'Buses	119	93	110	106	...	94	97	103	101	...	3½	396	- 33
Huddersfield Corporation	...	3,532	4,590	4,622	...	5,072	5,028	4,999	5,650	...	5	22,779	+ 10,615
Ilford U.D. Council	1,334	1,159	1,188	1,204	...	1,456	1,501	1,408	1,525	...	4½	6,418	+ 1,195
Ipswich Corporation	1,024	892	865	889	...	865	831	770	860	...	4	3,641	- 360
Isle of Thanet...	1,584	916	790	850	...	805	681	596	695	...	29½	17,960	- 400
Kilmarnock Corporation	342	325	330	327	...	366	356	345	373	...	50	18,422	+ 3,409
Leicester Corporation	7,064	6,456	6,758	6,623	...	6,401	6,384	6,102	5,760	...	—	—	—
Liverpool Corporation	26,907	26,245	27,214	27,691	...	29,981	28,258	23,049	25,198	...	17½	479,248	- 33,333
London County Council	79,917	79,549	81,448	84,307	...	100,247	99,237	92,849	96,885	...	4	375,372	- 62,552
Maidstone Corporation	791	393	371	406	...	895	458	435	441	...	4	2,229	- 267
Manchester Corporation	14,387	17,698	29,944	30,386	...	50,803	37,851	37,534	40,598	...	4	166,786	+ 80,328
Newcastle-on-Tyne Corporation ...	11,221	9,065	...	9,615	...	11,057	10,941	...	10,837	...	4½	46,939	+ 5,266
Nottingham Corporation	9,195	7,201	7,541	7,397	...	7,630	7,357	7,085	5,975	...	4	28,050	- 3,285
Oldham Corporation	436	4,504	4,487	4,528	...	4,356	4,591	4,212	4,434	...	6	25,133	+ 3,829
Reading Corporation	1,665	1,685	1,582	1,677	...	1,697	1,605	1,537	1,532	...	4	6,371	- 239
Reading Motor 'Buses	221	180	182	178	...	330	306	272	301	...	4	1,209	+ 437
Rotherham Corporation	2,533	2,499	2,534	2,642	...	2,164	2,092	2,092	2,118	...	4	8,467	- 1,742
St. Helens Corporation	1,618	1,633	1,756	1,807	...	1 452	1,775	1,628	1,671	...	4	6,527	- 288
Sheffield Corporation...	21,205	19,916	20,151	20,261	...	19,180	18,804	19,656	18,083	...	4½	84,872	- 4,701
Southampton Corporation	3,509	2,706	1,436	2,978	...	3,306	3,124	2,990	2,706	...	4	11.617	+ 986
Southampton Motor 'Buses	140	142	317	206	...	96	88	86	168	...	4	434	- 573
Southend Corporation	2,651	1,744	1,669	1,741	...	1.720	1,864	1,724	1,592	...	4	6 900	- 904
South Shields Corporation	1,554	1,783	1,778	1,873	...	1,791	1,394	1,362	1,449	...	5	6,708	- 635
Sunderland Corporation	4,624	2,879	2,860	2,954	...	4,051	2,443	2,013	2,034	...	4	10.543	- 2,776
Swindon Corporation	413	356	356	351	...	417	365	346	374	...	3½	1,445	- 31
Tyneside Tramways and Tramroads	2,178	917	1,050	...	...	1,154	1,100	1,025	...	...	—	—	—
Wallasey Corporation	2.675	2,348	2,404	2,424	...	2,653	2,640	2,570	2,785	...	4½	11.563	+ 629
Wallasey Motor 'Buses	206	142	158	142	...	167	224	163	250	...	4½	883	+ 205
Walsall Corporation	2.018	1,593	1,661	1.684	...	1,656	1.643	1.583	1,628	...	5	7,177	- 576
Walsall Motor 'Buses	1,243	886	944	950	...	951	870	823	840	...	5	3,913	— 600
Walthamstow U.D. Council	2.154	1,805	1,917	1,973	...	2,006	2,019	1,744	2,100	...	4½	8,635	+ 122
Warrington Corporation	981	959	977	984	...	1,034	1,047	1,008	1,042	...	4	4,131	+ 230
West Ham Corporation	5.667	5,171	5.200	5.390	...	6,123	6.083	5.757	6,106	...	4	24.070	+ 1.861
Wolverhampton Corporation ...	2,722	2,238	2,327	2,322	...	1,993	2,187	2,120	2,218	...	4	8.518	— 1,092
Wolverhampton Motor 'Buses ...	424	360	372	368	...	546	569	559	587	...	4	2,262	+ 738

Colonial and Foreign Tramway Traffic Returns.

Companies Issuing Weekly Returns.

NAME OF COMPANY.	1920. WEEKS ENDED April 10	April 17	April 24	May 1		1921. WEEKS ENDED April 9	April 16	April 23	April 30		AGGREGATE. Wks.	1921.	Increase or Decrease.
	£	£	£	£	£	£	£	£	£	£		£	£
Anglo-Argentine	70,496	81,304	80,571	77,987	...	80,859	85.004	85,103	81.423	...	17	1,367,581	- 113,870
Calcutta ... ... Rs.	87,180	92,514	94,833	92,661	...	87,647	90,497	87,215	86,210	...	20	1,174,044	- 404,350
Madras... ... ... Rs.	(2 weeks)	55,515	...	...	...	(2 weeks)	49,568	...	...	...	—	—	—
Pernambuco	7,039	7,095	6,823	6,875	...	3,809	3,845	3,828	3,454	...	17½	74,083	62,663

Companies Issuing Monthly Statements only.

	1919. Nov.	Dec.	1920. Jan.	Feb.	Mar.	April	1920. Nov.	Dec.	1921. Jan.	Feb.	Mar.	April	Wks.	AGGREGATE. 1920-21.	+ or -.
	£	£	£	£	£	£	£	£	£	£	£	£		£	£
Ballarat & Bendigo	4.220	5.119	4,249	4,279	...	...	4.601	5.342	4.593	4.700	...	...	48	52.231	+ 6.554
Brazilian Trac. Mlrs	9796.000	9739.000	9655,000	9381.000	9900.000	...	12199000	12600000	12875000	11941000	13102000	...	13	37.918.000	- 8 982.000
British Columbia	$733,981	783,324	828.709	746.030	761.182	...	805,633	868,677	868.202	792,590	816.452	...	39	7,186,953	+ 629,116
Buenos Ayres L'e'z.	50.634	55,873	52,643	52,468	55.000	53,429	56,747	62,857	61,111	53,952	59.365	60.238	44	570,952	+ 63.835
Burma	46,755	43,571	41,750	...	45,117	...	53,679	50.481	50,036	...	50,930	...	34	408,826	+ 51.086
Cape Town ...	...	...	...	...	...	...	25.628	29,768	...	...	...	...	—	—	—
Carthagena & H. ...	2,549	2,923	4,748	4,008	3.493	5,482	2,714	5,560	3.877	2,839	2.226	2.329	17	11.271	- 6,460
Cordoba	11,255	14,923	16,350	16,915	18.522	...	19,141	19.307	18.703	18.600	21.736	...	52	237,522	+ 36.887
East India ...	2.709	2.916	2,988	3,001	3.592	3,916	4,234	4,271	4,299	3,819	4,168	4,560	39	37,987	+ 10.418
Kalgoorlie	2,859	2,560	2.573	...	...	...	2,969	3,140	2.418	...	...	...	4	2.418	- 155
La Plata	4,905	...	*3,145	5.892	6,392	6.142	5,573	...	6,506	*727	3,404	5,878	17	16,516	- 5,066
Lima	...	...	...	56.162	...	...	...	...	...	60 718	...	...	8	124,329	+ 9,593
Manila ...	$248,350	276,730	278,451	278.437	...	...	320.345	315,599	321,450	306.389	...	...	9	627,839	+ 71,651
Monte Video ...	40.308	...	...	45.259	...	...	43,846	...	...	48,119	...	...	17	191,763	+ 14,054
Para	25,421	24,412	24,306	24,292	24.872	...	24,285	24,253	24,231	22,596	24,240	...	17	95,320	- 2,562
Port Elizabeth ...	...	...	...	...	...	...	6,620	8.185	...	...	...	...	—	—	—
Rangoon	7,379	7,517	R112000	115.000	...	...	6,964	8,000	R122558	120,718	...	...	9	243,306	+ 16.276
Toronto ...	$1111,177	...	1130.486	1113.717	1255,668	...	1250,414	...	1274,251	1228,722	1318.273	...	13	3.821,246	+ 321,375
Winnipeg ...	$461,449	...	498,837	444.873	456,915	...	477,957	...	506,229	460,125	495.208	...	13	1,461,562	+ 60,937

* Strike of employees.

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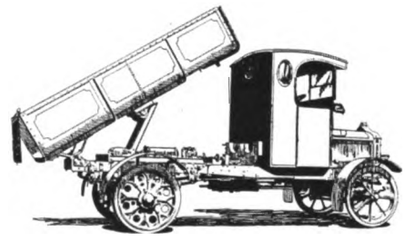
Daimler

RECENT DELIVERIES
of
DAIMLER 2-3-TON
COMMERCIAL CHASSIS

ROBINSONS MOTORS LTD., SCARBOROUGH
CITY OF WESTMINSTER, HIGHWAYS DEPT.
FARGHERS GARAGE LTD., DOUGLAS, ISLE OF MAN
RICHMOND GARAGE, RICHMOND
WESTCLIFF-ON-SEA MOTOR CHAR A-BANC CO.
W. CRAWFORD & SONS, BRIDGWATER
ASHTON-UNDER-LYNE CORPORATION
CLIFTON & KERSLEY COAL COMPANY
MANDENO SONS & HEWITSON, LIVERPOOL
G. FOWLER & CO., COWES, ISLE OF WIGHT
CROSVILLE MOTOR CO. LTD., CHESTER
DAVENPORT (C. B.) LTD., BIRMINGHAM
BUTTERLEY COMPANY LTD., DERBY
GLAMORGAN COUNTY ASYLUM, BRIDGEND
W. H. FURPHY, ESQ., LIVERPOOL
HEREFORD & MONMOUTH TRANSPORT CO. LTD.
PEEL CONNER TELEPHONE COMPANY LTD.
ONCHAN MOTORS LTD., DOUGLAS, ISLE OF MAN

The above deliveries are indicative of the adaptability of the Daimler Chassis to all trade purposes



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COVENTRY

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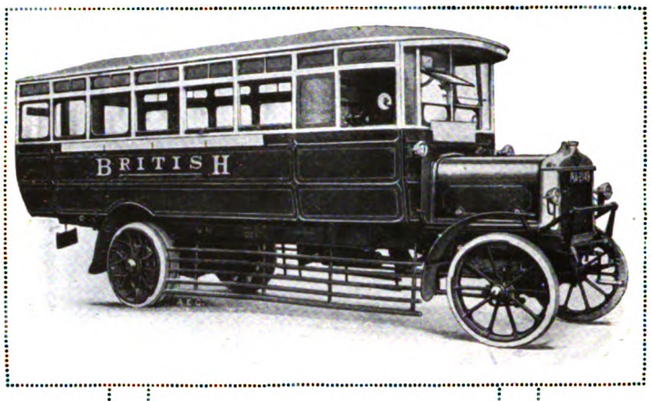

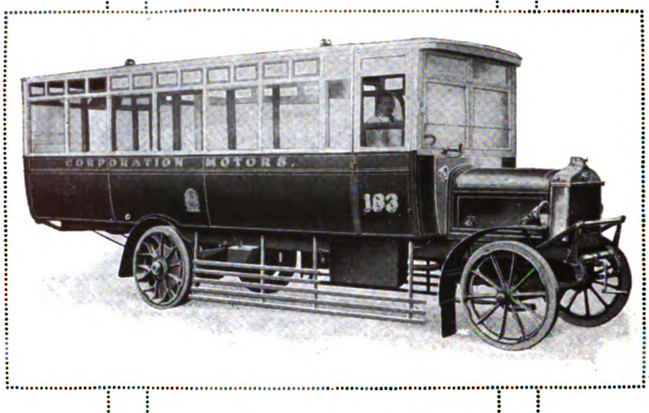

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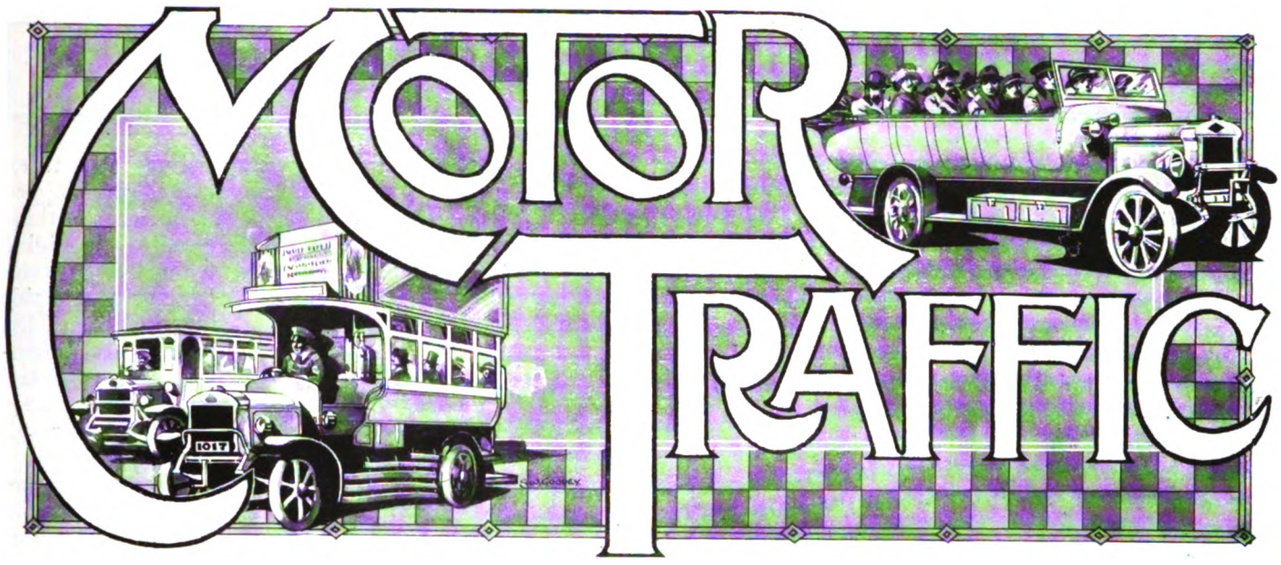

THE PRESENT POSITION.

The effects of the coal strike upon the commercial vehicle manufacturing industry are liable to be very serious. Just prior to this unfortunate dispute the industry was beginning to pick up after a period of considerable depression. On the whole, although a certain number of firms had been obliged to suspend operations, we were beginning to congratulate the industry on having as a whole successfully weathered the storm. Now we have a new complication, the result of which may well be that one or two established concerns which ought properly to have seen their way through the crisis will find themselves embarrassed, perhaps to the point of dropping out of the business. The strike naturally leads to a general feeling of uncertainty, and the consequent postponement of the placing of orders. It also tends to inflate the cost of living for all sections of the community, and to compel the reduction of output of manufacturers, owing to shortage of raw materials dependent upon coal for their production. Thus, both by limiting output and by tending to postpone the fall in wages which must naturally follow on a substantial decrease in the cost of living, the deadlock has made it more difficult for manufacturers to reduce their prices while still retaining reasonable profits. Consequently, the ill effects may be felt in the oversea markets, even after they have disappeared in the home markets.

NECESSARY REVISION OF TAXATION.

Experience of the working of a new system of motor duties up to date has now been sufficient to show that prompt revision of the scheme is necessary in many directions, and it is to be hoped that this fact will be recognised in this year's Finance Bill. It seems likely enough that the duties will realise more than was expected of them. If this is so—and if we also recognise, as we must, that the number of cars licensed is appreciably smaller than would have been the case had trade conditions been normal—there would seem to be justification for a general reduction in the scale of taxation, such as was foreshadowed by the Ministry of Transport in the event of the resulting revenue exceeding the estimate. Even if the Ministry does not feel disposed to modify the whole scheme in this way, there are still numerous details in respect of which simplification is necessary, and concessions will be justifiable. The use of three totally different bases of taxation has proved to result in numerous complications and points of doubt. It would be just as well to decide once and for all that any vehicle generally used for commercial purposes may, if its owner so desires, be registered for taxation on the horse-power basis. It is absurd to perpetuate a system under which the more restricted use of the vehicle often entails a higher payment in respect of taxation. Another anomaly is the provision for a rebate in respect of cars built before a certain date, unaccompanied by any similar provision in respect of hackney carriages and commercial vehicles. Suppose that a trader uses an old touring car chassis with an appropriate body for the delivery of his goods. As things stand he must pay on the basis of weight, though very probably he would get off cheaper if he paid on the basis of horse-power. If he uses the vehicle not only for trade but also for other purposes, the latter course is open to him, and in that case he can claim a 25 per cent. rebate on account of the age of the engine. It would be just as reasonable to allow him to claim a similar rebate when taxed upon weight, on the grounds that in more modern vehicles weight is cut down without any sacrifice of strength. A point at any rate worth considering is whether the use of pneumatic tires in connection with commercial vehicles and large hackney carriages should be encouraged. If so, it might be good policy to allow a rebate when such tires are fitted to vehicles licensed on the basis of weight or of carrying capacity. This could be justified on the grounds that such vehicles travelling, as they must do, at moderate speeds, are less injurious to the roads than similar chassis mounted on solid tires.

PRODUCER GAS AS FUEL.

The proposal to substitute producer gas for petrol as the standard fuel for the more substantial types of commercial motor vehicle is no new one. Experimental work with this end in view has been going on for a dozen or more years. Progress has, however, been somewhat slow despite what is apparently the overwhelming advantage of the system. To indicate the nature of this advantage it is only necessary to point out that in one instance to which attention has recently been drawn it is claimed that the cost of the gas is such as to be equivalent to petrol at 7½d. per gallon. In some designs the producer gas installations have been cumbrous and very expensive. They have

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MOTOR TRAFFIC

thus increased the cost of the vehicle and at the same time materially reduced its useful carrying capacity. They have also involved considerable maintenance costs. It would seem that we have now reached a point at which a practical installation is obtainable, so designed as not to occupy any space that would otherwise be utilised for useful load. Suppose that, in the case of a 3-ton vehicle, a hundred miles can be covered on the consumption of 300 lb. of coke, there is no material loss in load-carrying ability, though on long journeys there may be some slight sacrifice of carrying capacity due to the somewhat bulky nature of the solid fuel. Next we must take into account the cost of the installation. Suppose this to be £150, and suppose that its use represents a saving as regards the fuel bill of twopence a mile. In that case £1 is saved in 120 miles, and the installation may be said to have paid for itself when 7,200 miles have been covered. This, of course, assumes that in the meanwhile the cost of upkeep has been negligible. This has not been the case with most of the producer gas installations hitherto designed for motor vehicles. One of the troubles has been that the exceptionally high temperatures involved have led to overheating of metals and the constant need for renewal of parts. One of the most attractive things about coal gas as a motor fuel is that it can be generated from charcoal, and thus suggests a solution of the fuel problem in countries entirely dependent upon imports for liquid fuel supplies, and possessing small or no stocks of coal but ample supplies of wood. We may, perhaps, look forward to the day, forecasted by Mr. John Wells, when all our vehicles will use producer gas generated from waste vegetation. On the whole it would seem that the main practical tests of producer gas plants ought to take place overseas, and it is satisfactory from this point of view to note that the Crown Agents for the Colonies are experimenting in the employment of producer gas as a motor fuel under colonial conditions. The scheme should be most attractive where liquid fuel is exorbitantly expensive or even unobtainable. It must be less attractive in a country like ours, where we have at least an efficient system of petrol distribution. Great Britain is, then, not the easiest country in which to establish the new system. The inducements to experiment with it in certain other parts of the world are very strong, and we are inclined to think that its adoption here will be a gradual result of its success in such countries as experience great difficulties owing to shortage both of liquid fuels and of coal, and are therefore forced to be dependent on fuels obtainable directly from timber and other vegetable matter.

TRAFFIC PATROL.

Heavily taxed as the ratepayers of London are for the maintenance of the police force, without any voice in controlling the expenditure, they will not grumble at the outlay entailed by the moderate experiment in the use of motor patrols for regulating the traffic on the busiest routes. Lovers of the horse will rejoice to see the removal of those creatures and their riders from the midst of motor traffic, for although the horses are superbly trained there are occasional prancings that make onlookers apprehensive. The rider, too, on dismounting to perform any duty is handicapped by the care of his horse. There will be neither of these disadvantages in the case of the two motor riding constables, travelling, if need be, at a speed in excess of other vehicles. The occupants of the cycle and side car will be able to traverse more than ten times the mileage of the equestrian, giving an effective supervision of traffic which is now lacking, except at central spots. As one of their chief functions is to keep slow-moving vehicles to the side of the road, the result of their work will be a speeding up of mechanical transport. Both tramway cars and motors at present have to contend with obstruction that would not be attempted if horse drivers ran the risk of coming under the observation of a patrol. This task does not constitute the only duty of the patrol. One commendable object is the detection of noisy exhausts, still prevalent among motor cyclists, despite the fact that the absence of an effective cut-off constitutes an infringement of the law. In the course of time it is to be hoped that steps will be taken to penalise drivers whose inefficiency is shown by the polluting of the air with burnt gases. As to the machines at the disposal of the patrols they cannot be looked upon as ideal for the work. A lounging position for the side car occupant is not conducive to alertness; he should have a seat upon which he can sit upright and preferably at the same height as the rider of the cycle. At no distant date we hope to see each patrol reduced to one constable astride of a motor cycle. That change will conduce to economy, and should be brought about as soon as the patrols have gained experience and efficiency.

ROADS IMPROVEMENT ASSOCIATION.

The Distribution of Motor Taxation.

At the annual meeting of the Roads Improvement Association, held at the Surveyors' Institution, Mr. W. Rees Jeffreys (vice-president) occupied the chair. In moving the adoption of the report, he said the association must see that the fruits of its past propaganda were reaped. At the present time over £8,000,000 was being provided towards the maintenance and improvement of the roads by taxation of motor vehicles. Much of the money had been received, but he could not find that any of it had definitely been granted to local authorities. If Treasury control was to be revived the association must watch very closely how it was going to operate in the granting of this money to roads.

Mr. E. S. Shrapnell-Smith (hon. treasurer), in presenting the accounts, strongly supported the view that it was imperative for the R.I.A. to be on the alert to secure the expenditure of the money collected by motor taxation upon the roads. There was danger of the money being hoarded, and unless the R.I.A. conducted an active propaganda it was likely that at the end of the year they would find that instead of the Ministry having distributed the funds at their disposal they would have a large proportion of the £8,000,000 still in hand and another £8,000,000, and probably more, being levied for road improvements which were not taking place.

Prince Arthur of Connaught was re-elected president.

It is proposed to accommodate in the Dundee municipal garage the omnibuses to be acquired by the Tramways Committee. Mr. H. Richardson, the electrical engineer, has recommended that lorries purchased in the future should be stationed at the garage and be lent out to whichever department requires them. It is also proposed that all motor vehicles required for any department shall in future be bought by and be the property of a new department now being set up.

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A SUBSTITUTE FOR PETROL.

THE PARKER PRODUCER GAS PLANT.

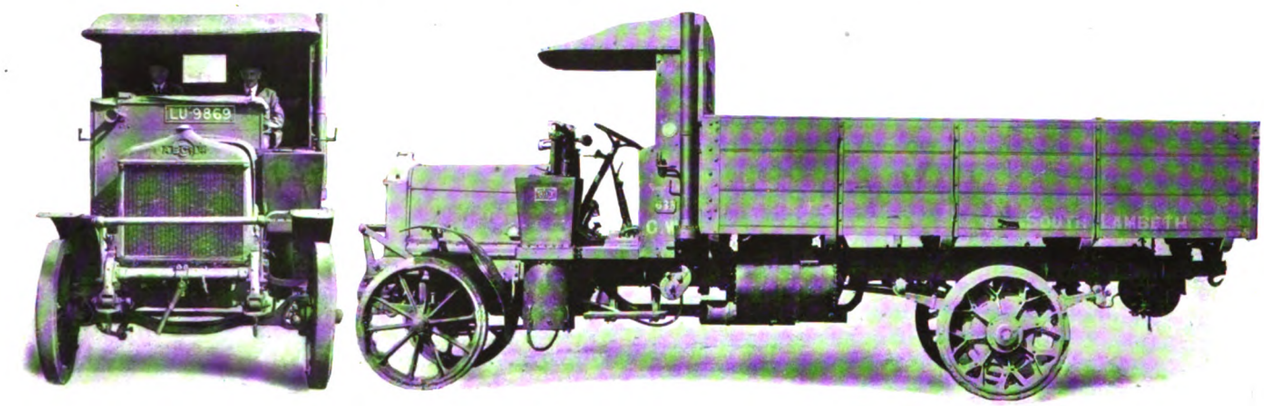
At Hampstead, on April 27, tests were made with motor lorries fitted with the Parker producer gas plant, which can be fitted to existing vehicles at a cost of £150. The additional weight of the Parker producer plant amounts to only about 8 lb. or 10 lb. per brake horse power of the motor. As a number of three-ton lorries fitted with this plant showed a saving of at least 75 per cent. in working costs, and any type of commercial motor vehicle can benefit equally, the extra weight should not deter conversions.

The Parker plant was fastened to the off-side of the lorry against the dashboard, and the producer itself is constructed of mild steel plate with welded joints, surmounted by a hopper of similar material, from which coke fuel is fed into the firebox at the bottom of the producer. The firebox is equipped with a special refractory lining made from a patented composition which resists heat to such a remarkable extent that an oxy-acetylene blowpipe flame has no destructive effect upon it. The fire-grid supporting the incandescent fuel (coke) is in steel casting, and a novel point about the arrangement is that the bottom portion of the grid forms a trough containing water, which is kept at a definite level by means of a float feed, the supply being received from the tank that would otherwise be used for petrol. This device not only prevents overheating of the fire-grid, but supplies the necessary steam to the producer. Thus one of the most important points which have in the past hampered progress in the adaptation of producer gas to motor vehicles —the rapid destruction of parts due to high temperatures—has been satisfactorily overcome.

Since the introduction of the Parker producer, eighteen months ago, it has been used by several important transport undertakings. The Crown Agents for the Colonies have ordered a number of sets adapted for burning charcoal for use on vehicles in Nigeria, where petrol costs 15s. per gallon. The Great Western Railway Company, Messrs. J. I. Thornycroft and Company, Karrier Cars, Limited, and the British Automobile Company are also using the plant, and the last mentioned Company are about to experiment in the use of the plant on an omnibus.

Records compiled with the Parker producer gas plant show that a three-ton lorry fitted with it will carry a full load for 100 miles on a consumption of 300 lb. of coke costing 13s. 8d., taking coke at the price of £5 per ton. If this lorry had used petrol as its fuel it would have consumed about seventeen gallons, costing £3 per £100 miles. Thus, in a journey of 100 miles, the saving of fuel costs is £2 6s. 4d. In a three-ton lorry equipped with the plant which has been in regular use for some time the fuel costs work out at 1·26d. per mile, ·15d. per gross ton mile, and ·36d. per net ton mile.

It is of interest to add that Sir Dugdale Clark stated to the Board of Trade "Inerts" Committee, on April 27, the advantages of internal heating by producer gas plant for producing motive power by gas engines. This plant, he said, was now in extensive use in the United States. A gas suitable for producing heat, motive power, and light, could be produced at the high thermal efficiency of seventy-five per cent. if sufficient latitude were allowed in the matter of inert percentage. The present average efficiency of gas production and distribution in this country was approximately forty-five per cent. The process allowed of a large saving of coal.



A.E.C. Lorry Equipped with Suction Producer Gas Apparatus.

ADMIRALTY MOTOR TRANSPORT.

CENTRALISATION OF CONTROL.

An Admiralty order states that with a view to further economies in the use of motor transport and to a closer co-ordination of control, it has been decided to place the motor transport at all Dockyard Ports on a uniform footing, and the following general principles have been approved—

(*a*) Central organisation to be arranged in the dockyards to deal with the requirements of all departments of the yard, and to undertake transport work for other establishments in the port which may be beyond the capacity of the vehicles allotted to those establishments for their normal internal requirements.

(*b*) The organisation, garages, vehicles, and staff of drivers and mechanic drivers to be under the control of the naval store officers at the dockyards, who will be responsible for the organisation of the motor transport service of the yard, and for the engagement and entry of suitable staff for the purpose.

(*c*) Departments normally to communicate their requirements 24 hours in advance for routine work, to enable the service to be organised to the best advantage. Urgent work to be telephoned as occasion requires.

(*d*) Fixed complements of vehicles and drivers to be allotted to each dockyard and establishment.

(*e*) Additional vehicles to be allotted to the central organisation as reserve vehicles, to replace others in the port withdrawn for overhaul and adjustment or repair, so that the pool of working vehicles may be kept at full strength.

POSSIBLE CALL ON U.S.A. TRUCKS.

Owing to the possibility of a general railroad strike consequent on a general reduction of employees' wages, the U.S.A. Council of National Defence are preparing for a mobilisation of motor transport. The Council have devised a plan for the allocation of motor trucks. Communications received from governors show that in the majority of States it will be easy to organise an efficient transportation system over the highways. The Federal Government, however, are not prepared to render assistance in any such proportion as heretofore, as the depletion of War Department trucks has been rapid during the past year. According to army officials there are 19,000 trucks available for army purposes. Of this total 13,000 trucks are engaged in military service. The other 6,000 could be placed on the road for service on receipt of an order from the Secretary of War.

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MOTOR TRAFFIC

ROAD VEHICLES THAT ARE TAXED.

THREE-QUARTERS OF A MILLION TO MARCH 7.

The total receipts paid into the motor taxation account by local licensing authorities in Great Britain between January 1 and March 7 was £7,092,422, according to a Government White Paper. The total number of licences, which include those for both motor vehicles and horse carriages, issued during the first two months of 1921 was approximately 757,000, of which 727,500 were annual licences, while 29,500 were issued under the quarterly-payment system. Licences in respect of 15,000 tramcars were issued, representing approximate tax receipts of £11,250. The approximate number of other classes of vehicle licensed and the yield of tax are as follows—

Vehicle.	Number.	Yield of Tax.
		£
Cars taxed on horse-power	202,000	2,810,800
Commercial goods	117,500	2,330,200
Motor-cycles	186,000	488,600
Motor hackneys (taxi-cabs, etc.) ...	41,700	1,190,500
Motor ploughs, etc.	6,000	1,500
Motor tractors, etc.	900	13,850
Road locomotives, etc.	1,800	29,150

It will be remembered that Sir Eric Geddes recently stated that the total receipts to March 31 were estimated at £7,785,000.

In 1914 there were 536,714 registered motor vehicles, the increase over 1913 being 111,695. After allowing for a great increase in the number of commercial vehicles, the number of private cars is less than it was eight years ago, and motor cycles are fewer by 47,000.

L.G.O.C. COACH TOURS.

On and after May 23 the London General Omnibus Company will operate a fleet of coaches from the Broadway, Westminster, four days a week to places of interest in the Home Counties. Each trip will average between 80 and 90 miles, the fare being one guinea inclusive of luncheon and tea at selected hotels. As at present arranged the weekly programme is as follows—

Monday.—Hindhead, *via* Kingston, Ripley, Guildford, Godalming.

Tuesday.—St. Albans, *via* Elstree, Hatfield, Bishops Stortford, Epping.

Wednesday.—Maidstone and Rochester, *via* Wrotham, West Malling, Sevenoaks.

Wednesday.—Windsor, *via* Staines and Burnham Beeches.

Thursday.—Tunbridge Wells, *via* Sevenoaks, Tonbridge.

Thursday.—Wendover and Burnham Beeches, *via* Rickmansworth, Princes Risborough.

Full particulars can be obtained from Electric Railway House, Westminster Broadway.

OMNIBUS CONSTRUCTION AT SHORT BROTHERS' WORKS.

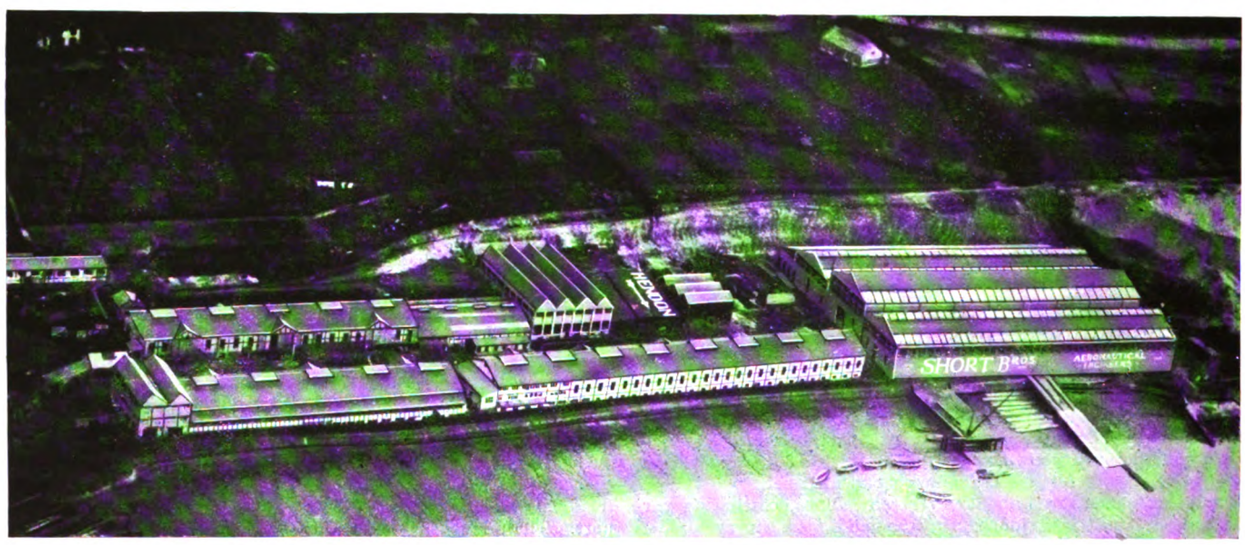
A NOTABLE PLANT AT ROCHESTER.

The firm of Short Brothers (Rochester and Bedford), Limited, whose London offices are at Whitehall House, 29-30 Charing Cross S.W.1, provide a noteworthy example of a concern whose vast war-production equipment has been successfully adapted to peace-

L.G.O.C. "K" Type Omnibuses Built by Short Brothers.

time commercial activity. The extensive works of the company on the bank of the Medway at Rochester are now engaged in the quantity production of bodies for omnibuses, commercial motor vehicles, and private cars.

Messrs. Short Brothers are well known in connection with the building of seaplanes during the war. The demand for these was so great that a highly specialised sawmill plant was installed and constructional methods developed in order to increase output to the maximum. The modern methods of production which enabled the output of seaplanes to be kept up were seen to be applicable to commercial and private motor body building—naturally with certain modifications. The firm have now brought the body building section of their business to the point of being able rapidly to execute orders, with the services of skilled men who were brought together and trained during the war. Their knowledge, gained at that time, of selected and seasoned woods is particularly valuable for the present purpose. The finest skill is demanded in the construction of seaplanes, and the same care applied to the building of motor bodies naturally results in sound workmanship of a high order.



An Aerial Photograph of Short Brothers' Rochester Works.

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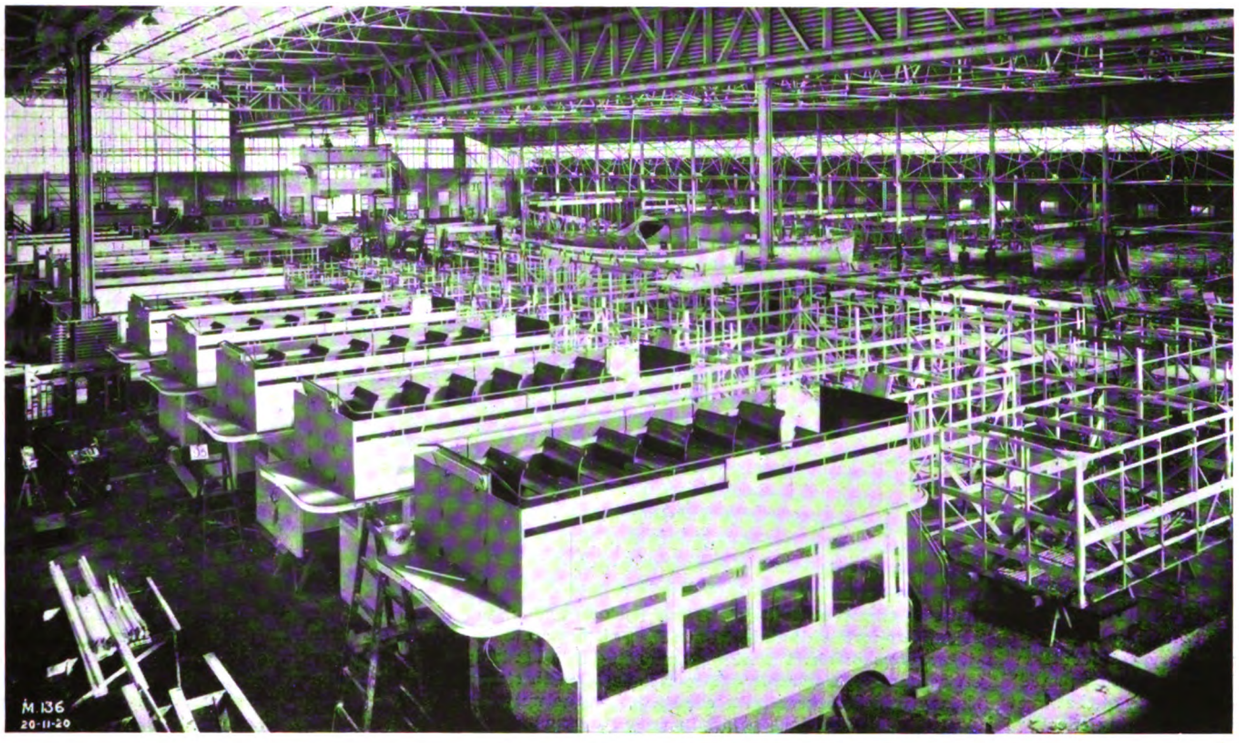
MOTOR TRAFFIC

Messrs. Short Brothers are at present engaged in the carrying out of various large contracts, including one for the London General Omnibus Company's "K" type omnibus bodies. Deliveries on this contract have reached 18 per week. The construction of railless trolley cars is also undertaken at Rochester, both the bodies and chassis being turned out. Another order now in hand is one for a large number of touring bodies for Buick motor cars.

Over 100,000 square feet of floor space, containing the most modern machinery, are available for the production of commercial vehicles. The shop in which omnibuses are erected once saw the evolution of the largest types of seaplane, and is therefore of exceptional dimensions—320 feet by 270 feet. An overhead gantry is installed, and when the bodies are completed they are lifted in their entirety, carried down to the doors of the shed, and put on their chassis for removal to the painting and finishing shops.



Omnibus Erecting Shop at Short Brothers' Works, Rochester.

The works are conveniently situated for the transport of their products, the Medway (with its access to the sea), the railway and roads all being at hand. Mr. W. P. Kemp is the works manager.

MORE PETROL NEEDED.

The need for exploiting new fields to maintain and increase the petroleum supply was emphasised by Mr. F. E. Powell, chairman of the Anglo-American Oil Company, speaking at the annual dinner of the Institute of Petroleum Technologists.

The oil industry, he said, never needed scientific development more than it did to-day. The refineries and chemists dealing with the product had done their part, but the whole world was crying for oil. America had 8,000,000 motor cars—more than all the rest of the world combined—and the cry was still for more oil. Technologists were searching for it all over the globe—in Mexico, the Philippines, Venezuela, etc.

He was a believer in an oil entente; he thought a combined effort should be made in the direction of finding supplies. Dr. White, of the United States Geographical Survey, said the world had only 43,000,000,000 barrels of oil left, while Mr. Ralph Arnold considered that the United States, at the present rate of consumption, would exhaust its oil supplies in the next 80 years. Consequently the scientists had got to get busy.

MR. A. WATSON ON TRANSPORT.

PLEA FOR ROAD AND RAIL CO-ORDINATION.

"Transport" was the subject of a paper prepared by Mr. Arthur Watson, general manager of the London and North Western and Lancashire and Yorkshire Railway Companies, and read on April 20 at a meeting of the Manchester Statistical Society by Mr. T. A. Kenyon.

In the course of the paper Mr. Watson said the advantages of the road motor vehicle could not be denied. With its use goods only need to be twice handled, and were therefore less liable to damage. The first point to consider in a survey of national transport service was economy by co-ordination. In the use of road transport there would inevitably be wasteful competition between road and rail unless the two were co-ordinated. The railway companies could do much by handling traffic on the roads as well as by rail, and it might be observed that they already had at their disposal stations, usually fitted with telephone and telegraph, which would be valuable as controlling centres. To some this suggestion might seem to foreshadow a universal transport trust, but he would point out that the King's highway was open to everyone, and that the road motor vehicles represented a democratic force of the first magnitude, and had destroyed monopoly in transport. "The economic interest of a transport organisation," he continued, "runs parallel to that of the public, for when it is rendering the best service to the community as a whole it has arrived somewhere near to the point of greatest good for itself. The men who manage the great highways of commerce in this country are as keen to have their systems operated in the best interests of the nation as any of the people who use them."

It was impossible to expect the spending of money on new arterial roads or the reconstruction of canals until the country had recovered its financial position, and he believed that the country must rely upon railways more than ever. Their capacity, already unequalled, could be enormously increased by the use of electric traction. London, for instance, would be within three hours of Manchester. The country was on the threshold of great electrical development, and the electrification of railways would give a great stimulus to a national system of electrical power production.

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MOTOR TRAFFIC

EDINBURGH OMNIBUSES.

MANAGER'S REPORT ON THE WORKING.

At a meeting of the sub-committee of Edinburgh Corporation Tramways Committee on April 20, Mr. R. S. Pilcher, the general manager, presented a report on the working of the motor omnibuses. The total operating expenses amount to 20·044d. per omnibus mile, and the interest and depreciation 3·338d., making a total of 23·382d. per omnibus mile, which leaves a profit per omnibus mile of 2·728d., or £6,806 13s. 9d. for the year to date. Mr. Pilcher states that out of seventeen municipal undertakings in the country operating motor omnibuses eight are being run at a loss. He favours the single-deck omnibus, which is used in Edinburgh, and claims that it must be strong enough to stand much wear and tear. The wear and tear on the northern omnibuses, he says, has been quite normal. He does not expect to find anything out of the ordinary maintenance to contend with. Several types of anti-splash mudguards have been fitted, and there is "every indication that a satisfactory mudguard will be devised." No skidding or slipping has been experienced on the heavy gradients, which have been sanded each morning and afternoon. In the event of icy conditions arising, however, he states that the roadway would require to be prepared for the omnibuses, as is done with other forms of traction. The vibration has been minimised very considerably on all severe gradients by running on the engine downhill, and thus restricting speed.

Mr. Pilcher explains that the Comely Bank and Hanover Street tramway lines are over 30 years old, and the rails and concrete foundations defective. The cars also were fit to run no longer. The Mound route was the most expensive route in the system, and the power-station at Henderson Row was costing more and more each year for maintenance. The whole of the section was being run at a loss. On the other hand, the omnibuses, he contends, are providing a faster and more reliable service than formerly, and it is not costing the passengers more, while routes have been extended.

The sub-committee delayed full consideration of Mr. Pilcher's report till a report had been received by the road surveyor as to the wear of the city roads since the institution of the omnibuses.

A CORRESPONDENT'S SUGGESTIONS.

Commenting on the report, the motor correspondent of *The Scotsman* says—"The outstanding feature of the service is that it is appreciated by the public. In common phraseology, it has met a felt want; and he would be a bold man indeed who would now recommend its withdrawal without being able to replace it with a faster and equally economical system. The public have made it absolutely clear that they wish to be transported from one point to another as speedily as possible. Comfort is desirable, but it is a secondary consideration in these days of short working hours and long recreation periods. On account of the granite-set surface of the majority of the streets, a heavy vehicle is essential to counteract the damaging effects of vibration. The obvious policy in the future, therefore, is to improve the road surface by introducing smooth paving wherever possible. Time alone can bring about this great change, as it would be foolhardy to attempt just now a wholesale scheme of improvement involving great capital expenditure, although the total sum would no doubt be far below the cost of adapting the present cable system to electric traction. It is apparent that the manager and his committee are gratified by the public favour which the system has already earned, and on that account it is to be regretted that the report contains no comment upon the suggestion that a few non-stop runs should be introduced. There is scope for a reasonable trial of the proposal. The merit of the whole omnibus system lies in the fact that the time-table may be altered practically at a moment's notice, and accordingly it is the best of all systems, since it is open to daily experiment. It is proved itself in Mr. Pilcher's own words—a speedy and reliable service."

LIFE-GUARDS ON HEAVY MOTORS.—The Public Control Committee of the London County Council reported that they had considered representations made by a coroner's jury in favour of the compulsory provision of side life-guards for heavy motor vehicles. The Departmental Committee on Road Locomotives and Heavy Motor Cars had reported in favour of the proposal, and the Council in December 1919 expressed its general agreement with the recommendation. In view of the large number of fatalities constantly occurring owing to the absence of life-guards, the Public Control Committee have asked the Ministry of Transport to consider the matter with a view to the issue of a regulation.

ROAD DAMAGE BY HEAVY TRAFFIC.

GLASGOW CORPORATION'S ACTION DISMISSED.

In the Court of Session on April 14, Lord Ashmore issued judgment in the test action by Glasgow Corporation against Barclay, Curle and Company, Limited, Whiteinch, Glasgow, for £450 as loss and damage incurred in repairing injury alleged to have been done to Kelvinside Street, Argyle Street, and Finnieston Street between April 22, 1918, and May 1, 1918, by the passage over them of excessive weights consisting of boilers varying in weight from 60 to 70 tons.

His Lordship observed that the case had no recorded or known precedent. The case fell to be distinguished from the somewhat analogous cases which arose under the Roads and Bridges Act of 1878 for recovery of extraordinary expenses incurred by road authorities in repairing highways. The statutory remedy referred to did not apply to the city of Glasgow, and accordingly the claim in this case was based not on statute but on common law.

The plaintiffs' case, so far as material, was to the following effect—(*a*) That they had made proper provision for the traffic of the industrial district of the city by constructing and maintaining the streets according to the best methods and with the most suitable materials; (*b*) that the transporting of the defendants' boilers on the occasions stated substantially altered and increased the burden imposed on the streets by the usual traffic; (*c*) that in consequence of the excessive weights many hundreds of the granite setts in Kelvinhaugh Street, Argyle Street, and Finnieston Street were "broken," involving expenditure in repair to the extent of the sum sued for; and (*d*) that it was the duty of the defendants to have prevented the damage, and that they could have done so by the use of properly constructed bogies "of a well-known type such as are used for the like purpose in Dundee."

The defence might be stated generally as follows—(*a*) The streets were not properly constructed and maintained, and, in particular, as regarded construction, that the setts used were hammer dressed, which were unsuitable for heavy traffic, and that nidged setts (with smooth dressed surfaces) should have been used; and as regarded maintenance, that during the war the streets had suffered serious deterioration, and were out of repair in April and May, 1918; (*b*) that the boilers referred to were not excessive in weight, and, on the contrary, that similar and also heavier weights had been regularly taken over the streets for many years; (*c*) that the damage complained of was largely accounted for by other heavy traffic and by lighter miscellaneous traffic; and (*d*) that the defendants did use care and caution to minimise damage, and that bogies of the Dundee type would have been inappropriate for the traffic.

His Lordship came to the conclusion that plaintiffs had failed to establish either (*a*) their general contention of fault with reference to the weight carried, or (*b*) their special assertion of fault in continuing to use the Glasgow type of bogie and in failing to adopt the Dundee type. Even on the assumption that his conclusion was right, he must go on to deal with the question of damage, because the plaintiffs' counsel submitted a legal argument to the effect that fault or no fault the defendants were liable, on the ground that they in using, or, rather, as he put it, abusing, the streets, and thereby causing damage to the plaintiffs, had committed a public nuisance. His Lordship said he had come to the conclusion on the facts that there was no reliable evidence on which the specific damage done by the defendants' traffic on the occasions referred to could be determined and assessed. Damage was certainly done by the defendants' traffic, but he thought the reasonable inference was that the damage resulted largely from the deteriorated condition of the streets, due to abnormal war conditions, and the consequent want of the usual more thorough repair and upkeep. His Lordship decided that the plaintiffs, on the facts brought out, could find no judicial remedy under the common law of Scotland, and no statutory remedy under the existing legislation.

THE HULL CORPORATION TRAMWAYS COMMITTEE have resolved (subject to a provisional order, already applied for, being granted) to purchase three double-deck omnibuses with the A.E.C. "K" type of chassis, at £1,850 each, for the contemplated omnibus service to Stoneferry. It was also decided to obtain a single-deck omnibus of a new type at a cost of £2,000. The committee agreed to charge a minimum fare of 2d. a mile or part of a mile, and 4d. for the whole distance. The manager (Mr. E. S. Rayner) was asked to report as to the advisability of using the omnibuses for the carriage of parcels.

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MOTOR TRAFFIC

MILLARS' "IDEAL" TRUCK DERRICK.

This type of derrick, fitted on a service truck, is adapted for garage and depot use, for raising and towing disabled cars, for general lifting purposes, and for unloading or loading material from or on to the truck itself.

The boom is raised and lowered to suit the work, and as it swings a full circle, is specially useful for raising cars which have been turned over in difficult situations. For towing, the boom is lowered to a horizontal position, and is locked so that it cannot swing. It holds a disabled car a fixed distance away, and thus does away with the necessity for a man to be in the following car to look after steering and brakes. A disabled car can be hooked on to the boom, with the fore end raised for travelling. A car can also be raised sufficiently to enable a mechanic to work under it in comfort.

Millars' "Ideal" Truck Derrick.

The derrick is equipped with a double-drum winch, the drums working independently for load and boom respectively. Sufficient cable is provided on the load-winch to pull cars 50 feet away from the service truck.

As a general rule the driver of a vehicle can operate the derrick, and if he is a mechanic can also carry out any temporary repairs which may be possible. This derrick, which is supplied by Millars' Timber and Trading Company, Limited, of Pinners' Hall, London, E.C.2, is obviously a useful machine for general hoisting purposes, and is supplied in capacities of 13 to 18 cwt. and with booms from 6 ft. to 10 ft. in length.

MUD-SPLASHING BY HEAVY MOTORS.—At a meeting of the Magistrates' Committee of Glasgow Corporation the question of damage caused to persons and property by the splashing of mud and water from the wheels of heavy motor vehicles was raised when the Town Clerk reported that he had communicated with the Secretary for Scotland as to the necessity for an order being issued, providing for suitable splashguards being fitted to such vehicles. He had now received a reply from the Ministry of Transport (Roads Department) stating that this question was being considered by the Departmental Committee on the Taxation and Regulation of Road Vehicles.

MOTOR VEHICLES FOR MUNICIPALITIES.

GREENWICH COUNCIL are obtaining a disinfecting van.

BIRKENHEAD WATCH COMMITTEE have purchased a chassis for a prison van.

EXETER COUNCIL have decided to borrow £1,430 for purchasing a steam wagon.

RYDE COUNCIL have ordered a 5-ton Garrett steam wagon at a cost of £1,240.

CARNARVON COUNCIL have been recommended by the Works Committee to purchase a 1-ton motor vehicle.

GLASGOW GAS COMMITTEE have requested a sub-committee to report on a proposal to purchase motor lorries.

SHEFFIELD CLEANSING COMMITTEE have authorised the cleansing superintendent to obtain tenders for further electric vehicles.

BRIDLINGTON CORPORATION have authorised the engineer to purchase a steam wagon and trailer at a cost not to exceed £1,500.

SWANSEA HEALTH COMMITTEE have instructed the borough surveyor to obtain estimates for the supply of two more Edison electric lorries.

EAST HAM COUNCIL have appointed a committee to consider the question of establishing a department for the running and repair of motor vehicles.

LONDON COUNTY COUNCIL have placed an order for an ambulance body with Messrs. Scammell and Nephew, Limited, and with Messrs. Flavell and Churchill for ten bodies for tipping wagons.

ABERDEEN DISTRICT COMMITTEE of the County Council have decided to purchase two 5-ton lorries and an Austin tractor if the Ministry of Transport will make a grant towards the cost.

Derrick Loading Lorries.

ILKESTON COUNCIL are considering the question of using motor vehicles for refuse collection. The Gas Committee have deferred their proposal to obtain a motor lorry until the refuse collection proposal has been decided.

BRADFORD CLEANSING COMMITTEE have visited Huddersfield and witnessed a demonstration of the work of a mechanically propelled street sweeping machine designed to sweep channels as well as roadways, and to pick up the refuse during the sweeping operation.

HACKNEY BOROUGH SURVEYOR has presented a report on the use of electric vehicles for refuse collection at Sheffield, Nottingham, and Leyton. He recommends the purchase of three or four electrics to be used in various areas, with a view to obtaining reliable data of cost of working in Hackney.

MARYLEBONE COUNCIL propose to purchase three reconditioned chassis from Straker-Squire, Limited, for £1,400. Thirty-three tenders were received. The Council already have two Straker-Squire vehicles in use for street washing purposes. Refuse collection is carried out by twenty Austin machines with low loading bodies.

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MOTOR TRAFFIC

OMNIBUS SERVICES.

PERTH.—The Corporation have granted permission to a local firm to run omnibuses to Coupar Angus, the route traversing part of the municipal omnibus service to Balbeggie.

BIRKENHEAD.—To defray part of the cost of the new omnibuses lately acquired, it is proposed by the Finance Committee of the Corporation that the sum of £13,253 be loaned from the reserve fund of the Tramways Committee, repayable in five years.

ESSEX.—Considering the roads unsuited for omnibus traffic, the Highways Committee of the County Council recommend refusing consent to a service proposed by the London General Omnibus Company from Ilford *via* Green Lane, Beacontree Heath, Rush Green, and Hornchurch to Upminster.

BRISTOL OMNIBUSES FOR MIDDLESBROUGH.—The Town Council have requested the tramways manager to prepare a scheme for a circular omnibus service to embrace the outlying districts, and purchased two omnibuses from the Bristol Tramways and Carriage Company. These vehicles are of the attractive Bristol saloon type,

Bristol Saloon Omnibuses Purchased by Middlesbrough Corporation.

and are shown in the accompanying photograph taken at the offices of the Bristol Tramways Company just as they were about to be delivered by road during the first week in May to the Middlesbrough Corporation Tramways.

COLNE.—The Local Legislation Committee of the House of Commons has concluded consideration of the Colne Corporation Bill. The committee decided to grant all the powers asked for in respect of omnibuses, but that the sanction of the Ministry of Transport must be obtained regarding the abandonment of the tramways.

BURNLEY.—In the Corporation Bill which came before the Local Legislation Committee of the House of Commons on April 19, power was sought to run motor omnibuses on routes outside the borough, namely, to Padiham, Accrington, and Rawtenstall. Padiham opposed, and this route was struck out. After evidence by Mr. H. Mozley, the tramways engineer, the committee decided there was no case for public omnibus powers, and struck out the clauses.

GRIMSBY.—A Select Committee of the House of Lords on April 25 considered the Corporation Bill seeking powers to construct tramways, to instal railless trolley vehicles, and to run omnibuses. Several clauses were amended as the result of the opposition of Cleethorpes Urban Council to the tramway and trolley vehicles proposals, effect being given to standing recommendations of Government departments. The Bill was passed and ordered to be reported to the House.

CARDIFF.—The City Council have adopted a recommendation by the Tramways Committee that £10,000 should be earmarked for increasing the omnibus service in and outside the city, and that the Corporation should run a service between the city and Llandaff and Whitchurch. Two companies are running on the Whitchurch route, and it was stated that further applications are about to be made to the Watch Committee. The Corporation agreed to a request of the Finance Committee that any scheme of the Tramways Committee should be submitted to the Finance Committee.

BELFAST.—At a meeting of the City Council Alderman Duff said a sub-committee of the Tramways Committee had been authorised to purchase six second-hand omnibuses, but the manager had specifically stated that the streets were not suitable for that class of traffic. The Tramways Committee had suggested that the Improvement Committee should go to the expense of making Connswater Street and Severn Street suitable, but there was no chance of that being done. Councillor Turner said they had no intention of purchasing the omnibuses until the streets were in proper order to run them.

TEES-SIDE.—In connection with the recent taking over of the Tees-side undertakings of the Imperial Tramways Company, Limited, by the Corporations of Middlesbrough, Stockton, and Thornaby, three new omnibus routes on the portion of the undertaking for which the Corporation of Middlesbrough is responsible have been arranged. These will serve Seaton Carew, Haverton Hill, and Grove Hill. The Seaton Carew route will be run jointly with the West Hartlepool Corporation, while the Haverton Hill service is intended to connect with the projected Middlesbrough Corporation ferry across the Tees at Billingham.

DUNDEE.—The magistrates on April 27 renewed for a month the application of a local company to run an omnibus to Forfar from High Street, but directed the applicants to arrange with the police to use another stance after that period, as the Corporation Tramways department propose to institute an omnibus service about the middle of June. An application by the same company to run to Arbroath was refused, the justices requiring the company to withdraw the portion of the scheme relating to Monifieth, which is served by tramways. Permission was given to another company to run omnibuses from Courthouse Square to Kirriemuir.

SOUTHPORT.—A Ministry of Health inquiry was held on April 12 into an application by the Corporation for powers to run omnibuses, construct a garage, motor house, cab office, taxi office, or other private premises, a place from which "hackney carriages" plying for hire must be registered locally. After evidence for the Corporation, witnesses appeared in opposition to the omnibus proposal on the ground of the vibration and damage caused to property by the existing coach traffic, and on behalf of the motor trades associations to the registration scheme. Two representatives of hiring firms stated that the trade would run omnibuses if the Corporation would guarantee any loss.

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MOTOR TRAFFIC

MOTOR TRAFFIC NOTES.

EAST HAM CORPORATION have asked a sub-committee to consider the question of the establishment of a repair shop for the Council's motor vehicles.

CONCRETE WHEELWAYS.—In consequence of the difficulty of providing a surface suitable for both horse and motor lorry traffic, experimental lengths of reinforced concrete tracks or wheelways are proposed to be laid on the Paisley and Cowglen Roads.

ADDITIONAL MOTOR INDEX LETTERS.—The Ministry of Transport has allotted the following additional motor index letters to the counties indicated—Derby, NU; Glamorgan, NY; Leicester, NR; Salop, NT; Somerset, YA; Stafford, RE; Warwick, NX; and Worcester, NP.

OMNIBUSES FOR TROOPS.—To afford protection at the West Fife coal mines, a battalion of Seaforth Highlanders was conveyed in motor omnibuses from Stirling. Most of the mining villages to the west and south of Edinburgh are on the routes traversed by the omnibuses of the Scottish Motor Traction Company.

THE PARKING PROBLEM.—The Watch Committee of Swansea Corporation have suggested that a flat piece of ground on the south-east side of Victoria Park, half an acre in extent, should be allocated as a park for coaches visiting the town, in order to avoid obstruction in the streets. The Parks Committee, however, refuse to give the use of the land for the purpose.

RED FLAG FOR ROAD LOCOMOTIVES.—Ellesmere Urban Council are asking local authorities to support a resolution requesting that legislation be introduced for dealing with heavy motor traffic. It is proposed either to limit the number of trailers to be drawn by road locomotives, or to insist that such traffic should be preceded round corners by a man carrying a red flag.

ENGINEERS AND MUNICIPAL TRANSPORT.—The agenda for the annual meeting of the Institution of Municipal Engineers, to take place in London on June 15-18, includes papers relating to municipal transport, road construction, public lighting, housing and town planning. On the second day Sir H. Maybury, director-general of the roads department, will give an address.

KARRIER MOTORS, LIMITED: A DENIAL.—Karrier Motors, Limited, of Huddersfield, deny a rumour that they propose to commence running char-a-bancs services. Their business, they state, is the manufacture of commercial motor vehicles, and it is not, and never has been, the intention of the directors to engage in competition with their customers who run goods and passenger services.

PASSING TRAMWAY CARS IN LONDON.—With reference to the suggestion made by some of the London Borough Councils that it should be made an offence for vehicles to pass tramcars on the near side where passengers are alighting or entering, the Commissioner of Police states that the police will as heretofore do all in their power to enforce the provisions of the law in order to secure the safety of persons using the highway.

A MUNICIPAL GARAGE.—Johannesburg Council have prepared a scheme for a municipal garage at a capital cost of £40,000. The Council some time ago accepted the principle of the garage, and it is proposed to purchase an existing establishment which can be secured for £17,500. Alterations will cost £4,500, and the capital outlay also includes £10,500 for 14 cars; £5,700 for 38 motor cycles; and £400 for two motor sidecars.

ROAD TRANSPORT CLEARING HOUSES.—In connection with the Manchester Road Transport Clearing House, Limited, of Milgate Buildings, Long Milgate, clearing houses for the movement of merchandise, foodstuffs, etc., by road, in lots of two tons and over, have been established at London, Liverpool, Birmingham, Manchester, Sheffield, Bradford, Leeds, Hull, Potteries (Hanley), Nottingham, Leicester, Bolton, Warrington, and Birkenhead.

GREENWICH AND MOTOR TRACTION.—Having considered the question of the adoption of motor traction, and concluded that the time has arrived when this means of transport should be co-ordinated, and the control and maintenance of vehicles placed under one committee in order to save expense and get the full use out of the vehicles purchased, and to be purchased, the Greenwich Borough Council have appointed a special committee to deal with the matter.

BY ROAD TO NEWMARKET RACES.—Owing to the miners' strike only one train was run from London to Newmarket for the races on April 29. There was consequently a great demand for private cars and coaches, the return fare by the latter vehicles being £1, as against 20s. 6d. by rail. The Daimler Company up to the day before the races had received orders for 75 of their vehicles, each carrying six passengers, and it was estimated that at least 150 of these cars would be required on the day.

ASSISTING THE AIR MINISTRY.—The Air Ministry have asked the Metropolitan Asylums Board, who have their own motor works department, to render assistance in the construction of an ambulance body, generally on the lines of the type in use by the Asylums Board. The Board have agreed, and the work will be carried out at the Mead ambulance station at an agreed charge of £300, plus any increase rendered necessary by reason of change of programme, increase of wages, cost of material, etc.

A TWENTY-FIRST ANNIVERSARY.—On May 12 the Royal A.C. celebrate the 21st anniversary of the first 1,000 miles car trial in 1900. The surviving competitors, judges, and makers of cars will attend the proceedings. The tour lasted from April 23 to May 12, the route being from London to Edinburgh, *via* Bristol, the highest power car being one of 12 H.P. Steering was by tiller, and the tires were of solid rubber. At that time the speed limit was 12 miles an hour and petrol was 7d. per gallon.

ARE HAULAGE MILEAGE RATES CANCELLED?—At the Alford District Committee of the Aberdeen County Council a question arose as to road contribution under the new Act. A Glasgow firm wrote regarding an arrangement made last year by which they paid 1d. per ton on haulage of timber over the Alford highways. They asked whether that arrangement was not automatically cancelled now. Twenty-five pounds had to be paid for the motor licence, part of that fee being allocated to road maintenance. The matter was left to the Clerk to investigate.

MOTOR TRAILER ATTENDANTS.—The Greenwich Metropolitan Borough Council, supported by a large number of other Metropolitan borough councils, have suggested that legislation be sought to make it compulsory for an attendant to be placed on all trailers to motor vehicles, to prevent the risk entailed by the dangerous practice of children riding on these trailers. The Public Control Committee of the London County Council, after consultation with the Commissioner of Police, has reported that they cannot advise the Council to take any action in the matter.

LONDON POLICE MOTOR PATROL.—On April 26 the Metropolitan police inaugurated the patrol of busy traffic routes by means of ten motor cycles with side cars. There are two constables to each patrol, the men wearing peak caps in place of helmets. Their duties are to guide traffic, keep observation on the plates and licences of motor vehicles, detect noisy exhausts of cycles, prevent dangerous and reckless driving, observe vehicles left unattended, report obstructions, keep slow traffic to the near side, and prevent boys and cyclists from hanging on the rear of vehicles.

L.G.O.C. ROAD CONTRIBUTIONS.—The Works Committee of the Battersea Borough Council report that they have had under consideration the condition of the paving in Wellington Road, and have been in communication with the London General Omnibus Company with a view to their making a contribution towards the cost of the paving works required. The estimated cost of relaying the carriageway and footpath on the south side of the road adjoining the company's premises is £391, and the company have agreed to contribute half the cost. The committee recommend that this offer be accepted.

AN EXPERIMENT IN NEW YORK.—The New York Central Railroad Company have initiated with the American Railway Express Company an experiment in Chicago and Cleveland for the delivery of goods in containers. Special express railway cars have been constructed to hold nine steel containers uniform in size, which are loaded from motor trucks at the point of origin and unloaded to trucks at the destination. Each container is 9 ft. by 6 ft., and has a capacity of 6,000 lb. It is estimated that by the use of cranes the railway cars which carry them can be loaded and unloaded in 40 minutes.

STANDARDISED AMBULANCES.—The normal maintenance of the fleet of motor ambulances of the Metropolitan Asylums Board requires that 13 new vehicles shall be obtained within the next twelve months, and the Board have decided that the wisest course to follow is for these to be constructed at its ambulance station. Twelve are to be similar to those last built there, and one of an experimental lighter type. This will enable a standardisation of type, and should secure considerable economies in maintenance, repairs, and spare parts. The approximate cost of the 13 ambulances will be £15,450.

PERSIA AND MOTOR TRANSPORT.—Sir Percy Sykes, lecturing on the British military operations in South Persia, to a meeting of

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MOTOR TRAFFIC

the Royal Geographical Society, stated that the expedition was instrumental in constructing one thousand miles of route suitable for light-wheeled traffic, over which cars were run 100 miles a day. General Sykes does not think, however, that motor transport in Persia is a commercial proposition, for several reasons. The routes are too bad, the distances too great, the population too scanty, and the cost of petrol too high. Moreover, Persians do not train well as mechanicians, and are reckless drivers.

WHO DRIVES A STEAM WAGON?—The question whether a man working the steering wheel of a steam wagon is to be regarded as the driver was raised in a case heard at the Guildhall, in which a man was summoned for driving without a licence. Defendant, on being asked by a constable to show his licence, replied, "I am not the driver; I am only steering it." A solicitor, who defended, argued that the other man in the cabin attending to the machinery was the driver. The presiding Alderman said he had no doubt the offence had been committed, and imposed a penalty of 20s. The licence, which the defendant had since taken out, would not be endorsed.

ALBION MOTOR CAR COMPANY.—The net profit for 1920, after making provision for depreciation, etc., was £65,122 (against £131,813 in 1919), while £22,731 was brought forward. After allowing for debenture interest and reserving £10,002 for debenture redemption, the balance was £66,805. The sum of £15,056 (against £59,646) is placed to reserve, and a final dividend on the preference shares of 3 per cent. is proposed, making the full 6 per cent. for the year, leaving to be carried forward £43,717. The 19th annual meeting was held at Glasgow, Mr. N. O. Fulton presiding in the absence through illness, of the chairman of the directors (Dr. T. Blackwood Murray). The chairman, in reviewing the firm's activities in 1920, said the new repair and service depots at the works at Scotstoun, Willesden, London, and Trafford Park, Manchester, were either completed or would shortly be so. Alluding to the accounts, Mr. Fulton said that although the profits showed a considerable reduction, the result was very satisfactory, having regard to the trade depression.

700 MILES A WEEK BY A "LEYLAND."

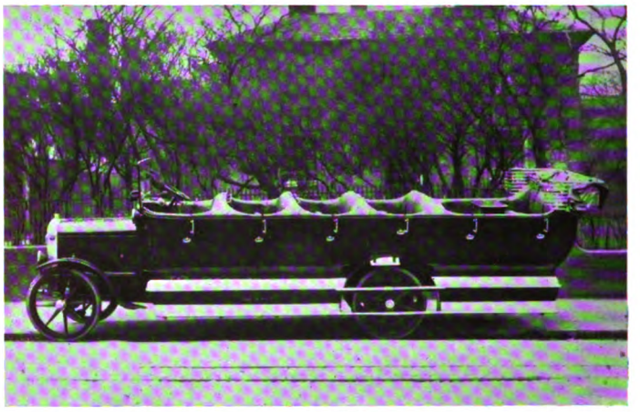
The Leyland omnibus shown in the accompanying photograph was delivered to Messrs. Skinners, of St. Leonards-on-Sea, in April 1911. Since that date it has been in constant use, and at present is fully justifying its existence by travelling 100 miles a day and working a full seven-day week.

A Leyland Omnibus Built in 1911, Still Averaging 100 Miles Daily.

Prior to 1914 it was run as a char-a-bancs, and was only fitted with a double-deck body when it was put on the roads as an omnibus. Up to date it has to its credit something over 300,000 miles. The owners state that a careful record has been kept as to the cost of repairs and renewals, which work out at a remarkably small figure. The engine is the well-known four-cylinder Leyland type, $4\frac{3}{4}$ in. bore, and the machine is bevel driven.

NEW THORNYCROFT COACH.

The accompanying photograph is of a very attractive new Thornycroft motor coach. The chassis is their 40-H.P. type "X," 14 ft. wheel base model, the body having been constructed by Messrs. Roberts, Ltd., to the order of Mr. Sanders, of Chasetown



New Thornycroft Coach.

(Staffs.), who is Messrs. Thornycroft's agent for the sale of their vehicles in that district. An interesting feature is the saloon compartment at the rear, with card table in the centre. We understand Messrs. Roberts have several more bodies of this type in hand, all to be fitted on Thornycroft chassis.

DEMONSTRATION AT DUNDEE.

HILL-CLIMBING BY TILLING-STEVENS OMNIBUS.

The makers of the Tilling-Stevens petrol-electric vehicles frequently display enterprise in giving demonstrations of their capabilities, and the latest exhibition was given at Dundee, where the Corporation Tramways Committee are about to introduce omnibus services. A local journal states that "several members of the Council, accompanied by Mr. Walter T. Young, tramways

Tilling-Stevens' Petrol-Electric Omnibus.

manager, made a tour with the omnibus, and an interesting part of the test was the climbing of such steep gradients as Hilltown and Constitution Road, which the vehicle accomplished in fine style.

"Subsequently one of the suggested routes *via* Balgay Park and the Esplanade was traversed, and the members of Council, who comprised Bailie Allan, Convener Malcolm, and Messrs. Powrie, Ogilvie, and James Reid, expressed themselves highly satisfied with the test." An illustration of the vehicle is given above.

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THE Tramway & Railway World
WITH MOTOR TRAFFIC SECTION

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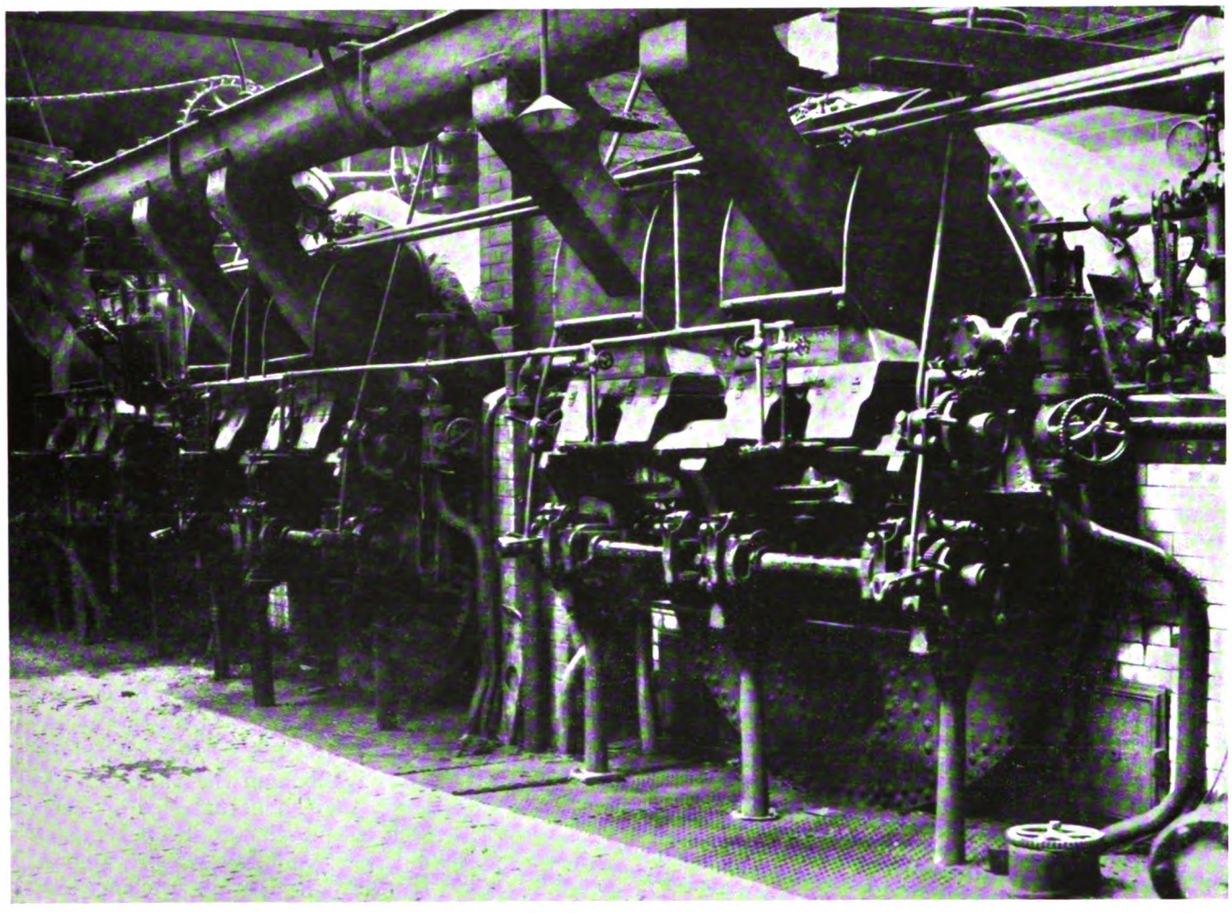
OIL FUEL ON HULL TRAMWAYS: COMPARISON WITH COAL CONSUMPTION.

By E. S. RAYNER, A.M.I.E.E.
(*General Manager and Engineer*).

As the Hull Corporation Tramways were the first undertaking to adopt oil fuel in their power-house, at the request of the Editor I give a short *resume* of our experiences, which may be of interest to other power-house engineers.



View of Boiler Fronts in Hull Corporation Tramways Power Station, showing Oil Feed Pipes.

Before the present coal stoppage took place we had some experience of oil fuel with an old type of burner which was very unsatisfactory, but the conditions created by the strike made it patent that if we were to maintain a service, some adequate alternative fuel must be found, and we therefore experimented with another and later type of burner with much more fortunate results. After experimenting with the Gretna Burner on one of the boilers, we decided to equip sufficient boilers to take the whole of our load with oil as a fuel. Incidentally, it was our opinion that in the interest of power users generally it was essential that an alternative source of raising steam should be found at a reasonable figure in order to prevent the effects that the monopoly of coal, as a fuel, has up to now had on industry.

The burner which we are using is gravity-fed with an oil outlet arranged in the centre of a jet of steam. The oil, as it flows through the burner, is caught by

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the steam in a whirling fashion, and thoroughly atomised in a baffle cone in front of the nozzle, before being projected into the furnace. The oil—Mexican residual—is first of all stored in large supply tanks (in our case an old boiler); from there it is pumped into a small feeding tank on the top of the boilers, placed about 4 feet 6 inches above the burners, where it is heated to about 90°. It then flows through steam heaters, and the temperature is increased to 175°. After that it passes through a filter and then down to the burners. The steam which is supplied to the nozzle is taken direct from the superheater, the pressure in our case being 150 lb., with about 160 deg. of super-heat. I attach great importance to the fact that we are using absolutely dry steam in our nozzle, as we found that when the pressure drops below a certain point and the temperature falls, we do not get anything like as good results.

COMPARATIVE RESULTS.

The following figures are the comparative results of 14 days' operation under oil fuel and 14 days under coal.

Coal as Fuel.

Coal	384 tons.
Price per ton	42s.
Calorific value	11,000 to 12,000 B.T.U.'s.
Units generated	238,865.
Lbs. coal per unit generated	3·6 lbs.
Cost of coal and ash handling	0·837 pence.
Labour employed, coal trimming	0·023 pence.
Total cost per unit generated for coal only	0·860 pence.

Oil Fuel.

Oil fuel	232 tons.
Specific gravity	·987.
Calorific value	18,750 B.T.U.'s.
Flash point	178° F.
Cost per ton	£5 5s.
Units generated	238,865.
Lbs. of fuel per unit generated	2·17 lb.
Cost of fuel per unit generated	1·223 pence.
Increase in cost of oil fuel over coal, considered as delivered to works as fuel	0·363 pence. per unit generated.

It will be seen by these figures that the calorific value of the oil used is 18,750 B.T.U.'s, and that of coal 11/12,000 B.T.U.'s, but the figure for coal is very much higher than that of the coal which was obtainable after the strike had been in operation a few weeks. The cost of oil delivered to our tanks was £5 5s. per ton, and the average cost of coal was £2 2s. This figure is, of course, a pre-strike figure. It must be remembered in this case that we are dealing with an emergency situation, and to make any fair comparison the strike price of coal should be taken.

COST OF INSTALLATION.

Under the coal figures I have included the cost of ash handling and coal trimming, but I have omitted the cost of the upkeep and maintenance of mechanical stokers, and many other minor economies in the way of labour, etc., which would count in favour of oil, as our installation was essentially an emergency one. For instance, the cost of delivery for oil is 15s. per ton, which figure could be very materially reduced if it was decided to use oil as a permanent fuel. However, I consider the net result of 1·223d. per unit for oil as compared with ·860d. for coal, very satisfactory.

The cost of installation on four boilers was approximately £300. We can in half an hour have all these boilers steaming on coal without dropping power or affecting the steaming of the boilers in any way. At first we experimented with these burners as auxiliary burners, using part coal and part oil, but we found that they worked equally well with broken firebrick spread on the grates (which are Vickers), and it gave us the advantage that we could adjust the bridge to suit the length of the flame by merely piling the broken brick at that point.

Some of the power plants which have since adopted oil fuel have had trouble with back fire. This is due to want of draught and pockets in the flues. To avoid trouble of this sort it is essential that the gases from the furnace should get clear away and up the chimney. There should be no corners or pockets where any unburnt gas (should there be any) which escapes from the furnace could lodge.

ADMISSION OF AIR.

Care has also to be taken that the right amount of air is admitted to the furnace—not too much and not too little. A rough and ready method of gauging this is to see that there is a slight bluish haze coming from the top of the chimney. There should be no smoke, which goes to show the presence of unburnt oil, whereas the absence of the haze shows excessive air. Of course there was a little difficulty in getting the firemen into the method of dealing with the oil, as its action in the furnace is very much quicker than coal; it is also necessary to pay close attention to the conditions of the load, but these technicalities have now been overcome, and our men do not find any difficulty in keeping steam.

I do not want to labour the question, as there are others who know considerably more about the burning of oil, as a fuel, than we do; but we have achieved what we set out to do. This was to obtain a substitute for coal at a reasonable figure, to maintain a full service on our tramways at an additional cost which was a very small percentage of what we should have lost in receipts had we been obliged to reduce our services in proportion to the amount of coal allotted us by the coal controller's department.

EFFECT ON TRAMWAY SERVICE.

As some guide as to what the loss in traffic receipts from a restricted service would have been, the effect of the colliers' strike in October and November last may be recalled. The cars were then started an hour later in the morning and the service ceased at 8 o'clock at night, instead of 11 o'clock; no service was run on Sundays; the all-night service was suspended, and several detailed alterations on the various routes were made. The result was an actual loss on account of the drop in receipts and the additional money paid in wages due to the national agreement, amounting in all to £5,800 for the three weeks, as compared to the previous three weeks.

During the present strike we have made no reduction of any moment in the services. Obviously, therefore, beyond the natural reduction in receipts due to bad trade, which is common to all tramways, we have not lost anything by the strike, apart, of course, from the additional cost of oil fuel over coal. This confirms my statement that the adoption of oil fuel at Hull has, from a financial point of view, been an unqualified success.

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OTHER OIL FUEL PLANTS.

As the coal stoppage continued, an increasing number of tramway power-houses and municipal electricity works installed oil fuel plants with successful results. Various managers have at our request supplied us with information as to their respective oil-burning systems—many of which have been noted in the weekly issues of THE TRAMWAY AND RAILWAY WORLD.

BARROW-IN-FURNESS.

When the stock of coal at the Corporation electricity works was running very low at the beginning of May, and it was found impossible to obtain suitable coal for maintaining the supply of current, the borough electrical engineer, Mr. H. R. Burnett, decided to instal oil fuel plant on one boiler, the evaporative capacity of which is 30,000 lb. per hour. Eight burners with valves and strainer were ordered from the Wallsend Slipway and Engineering Company, and arrived on May 6. A tank and pump were obtained from the local depot of the Shell-Mex Company, and the whole of the plant, which was erected by the Corporation staff, was working by May 12. At this time the stock of coal was practically exhausted; in fact, some assistance had already been obtained from Messrs. Vickers' power-house in order to maintain the supply of current.

The burners are of the steam jet type, the oil being supplied by gravity from an overhead tank. No storage tanks have yet been installed, the oil being taken direct from the rail tanks and pumped into the overhead tank.

Since the date mentioned practically the whole of the electricity supply from the Corporation works has been maintained by means of this plant, but arrangements have been made with Messrs. Vickers for the interchange of power between their power-house and that of the borough with a view to effecting the greatest possible economy in working. No restrictions have been imposed with regard to the use of the supply, but of course the output is much reduced by a number of works being on short time or closed down through lack of fuel.

The oil plant is undoubtedly more economical than coal at the prices ruling to-day. Mr. Burnett does not, however, consider it is likely to displace coal as a permanent arrangement in works such as those of the Barrow Corporation, where the boilers are fitted with efficient mechanical stokers and arrangements made for handling the ashes by mechanical means. The cost of labour in such works is, of course, very small, relative to the cost of fuel used, and therefore any appreciable increase in fuel cost will soon outweigh any saving in labour.

So long as oil costs more than about one and a half times the price of good coal, it is unlikely, Mr. Burnett thinks, to be used to any great extent in large generating stations, but in small works where hand firing has been in practice oil will no doubt compete with coal at a much higher relative price than one and a half times that of coal. It will also no doubt be retained in municipal power-houses as a standby, and for dealing with peak loads.

BLACKPOOL.

As far back as January last the Corporation electrical engineer and tramways manager, Mr. C. Furness, advised the Electricity and Tramways Committee to make provision for the installation of oil burners as auxiliaries on five of the boilers. This work was completed by the Gretna Engineering Company, of Carlisle, on April 2, the eve of the coal crisis.

A contract was entered into with the Shell-Mex Company for 1,000 tons of oil, and for some weeks the power-station has been using oil fuel as an auxiliary on the boilers. Provision is being made for additional burners of the "Kermode" type on two Lancashire boilers, exclusively for oil firing. Unless coal falls below £3 per ton the Corporation will, Mr. Furness thinks, find it to their advantage to continue burning oil fuel. There are storage facilities for 40 tons at the electricity works, and at the Bispham power-house on the Fleetwood tramway route one of the existing Lancashire boilers is being used as a storage tank for the reception of bulk supplies to the extent of 45 tons.

Had it not been for the oil installation, the management would have been obliged considerably to curtail the services.

BRISTOL TRAMWAYS COMPANY.

At the Counterslip power-station of the Bristol Tramways and Carriage Company there were installed Babcock and Wilcox water tube boilers equipped with Vickers' mechanical stokers for coal fuel. As the coal stocks diminished the boilers were converted for oil fuel burning until a sufficient number were so equipped as to operate the tramway system without assistance from coal.

The burner adopted is the Scarab, two being fitted to each boiler. Steam is used for atomising. The mechanical stokers were dismantled and the boiler fronts were bricked up and fitted with plates for carrying the burner lighting holes and air regulating door. In front of each boiler and five feet above the burner, a 1,000 gallon tank is erected containing heating coils and a thermometer. The supply to each of the six 1,000 gallon tanks is from a 6,000 gallon overhead tank temporarily brought into use for this service. The supply to the 6,000 gallon tank is pumped from a 100-ton barge moored alongside the station, the barge being fitted with heating coils to facilitate pumping. The oil is delivered by barge from the storage tanks at Avonmouth.

The whole of the work of conversion was carried out by the company's own staff. The adoption of oil has enabled the firm to maintain a normal tramway service.

As regards economy of working, the manager, Mr. Sydney E. Smith, finds that one ton of oil is equivalent to about 1½ tons of the best Welsh washed coal, but in the absence of any staple prices for coal no monetary comparisons between the two can be given, nor any opinion expressed as to the permanent use of oil.

NEWCASTLE-UPON-TYNE.

The whole of the boilers at Newcastle-upon-Tyne Corporation Tramways power-station have been adapted to burn oil, with the result that a normal car service has been resumed. The Wallsend-Howden low-pressure system is in use, and the storage tanks have a capacity for ten days' supply of fuel. The conversion was effected by the Corporation staff under the personal supervision of Mr. Ernest Hatton, the engineer and general manager. Until the relative price of coal and oil is ascertained at the conclusion of the coal strike, the management cannot give comparative figures as to the economical results obtained. The question of adopting oil fuel permanently is in abeyance for a similar reason.

BLACKBURN.

Four boilers out of a total of 12 have been equipped at Blackburn Corporation Tramways station for auxiliary firing in conjunction with coal. Three boilers have been fitted with Gretna burners of the

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steam jet type, one burner to each furnace. The fourth boiler is equipped for straight through oil firing, with burners supplied by the Wallsend Slipway and Engineering Company. These are also of the steam jet type.

In the case of the first three boilers, the burners are arranged for use with the existing sprinkler-type stoker, and in the latter case for the straight through oil firing the stokers were removed. The oil is delivered at the works in steam feed tanks and pumped into storage tanks (in the boiler-house) of a total capacity of 50 tons. From these tanks it flows by gravity to the burners. The fuel is supplied by Shell-Mex, Limited, and delivered at the railway siding in 15-ton rail cars. The change-over was carried out by the Corporation staff. The effect on restoring the services has been to put them on a 50 per cent. basis.

The electrical engineer, Mr. P. P. Wheelwright, considers that oil compares very favourably with the class of coal received since the miners' strike began; otherwise he states it is much too early to form an opinion. Nothing definite has been decided as regards the permanent use of oil.

CROYDON.

Two boilers have been converted for the burning of oil fuel at Croydon Corporation electricity works. Steam jet burners supplied by Messrs. Babcock and Wilcox are installed, the oil being fed by gravity from a small overhead tank. The oil is stored in a cast-iron feed water tank, and the feed pump has been adapted to lift the oil into the gravity feed tank.

The work was carried out by the department's own men, and the effect was to restore the tramway service to normal.

There is very little relative difference between the price paid for coal before the strike and the present price of oil, Mr. A. C. Cramb, the engineer and manager, states. The department have not yet had sufficient experience to give any very definite figures, but it is undoubtedly cheaper to use oil than it would be to purchase foreign or other fuels at present prices. No decision has been made as to the permanent use of oil fuel, but it is possible that it may be retained for emergency or peak load purposes.

EDINBURGH.

At the Tollcross power-station of Edinburgh Corporation Tramways, four furnaces which heat two dry back marine type boilers have been converted for the use of oil fuel. The burners, which work under the steam pressure system, and the air registers were supplied by Babcock and Wilcox. The oil is pumped from a road tank wagon, and the storage tank at the power-station has a capacity of ten tons. The conversion, which at the time of writing was on purely experimental lines, was carried out by the tramway department engineering staff, under the supervision of Mr. R. S. Pilcher, the tramways manager.

BATH ELECTRIC TRAMWAYS LIMITED.

The installation at the power-station of Bath Electric Tramways Company (of which Mr. W. E. Hardy is the general manager and engineer) consists of Babcock and Wilcox steam oil sprayers. These are supplied with fuel from tanks, with a capacity of 2,000 gallons, placed 15 feet above the burners. The work of substitution was carried out by the Corporation staff, and the car service has been fully maintained. It has been found that the cost of oil firing is about 60 per cent. dearer than with coal.

LONDON COUNTY COUNCIL.

At the meeting of London County Council on June 7, Mr. W. J. Squires (chairman of the Highways Committee) stated that at the Greenwich power-station two of the largest boilers had been converted for burning oil fuel, and were under full steam. Two additional boilers were in process of conversion, and it was anticipated these would be under steam in a few days.

SOUTHEND-ON-SEA.

At the time of writing work was in progress at Southend Corporation Tramways station of equipping a 30,000 lb. Niclausse boiler with the Scarab system, the oil being supplied to the burners under steam pressure. The storage capacity of the tanks containing the oil is 50 tons. The alteration to the boiler was being carried out by the British Niclausse Boiler Company.

The effect of the installation, it was anticipated, would enable a full service of tramway cars to be restored.

In addition, the Corporation have purchased from the Admiralty six Diesel oil engines (formerly used in German submarines), and two of these have been running since Christmas in a very satisfactory manner. By running these engines continuously during the miners' strike it has undoubtedly saved the situation, and enabled the tramways department to run a fairly satisfactory service of cars, otherwise it would probably have been necessary for the service to be stopped altogether.

PRESTON.

Preston Corporation Tramways, of which the general manager and engineer is Mr. J. F. Simpson, equipped one Lancashire boiler, 30 ft. by 8 ft., for oil burning in May, and a second has now been adapted. The equipment was supplied by the Gretna Engineering Company, of Carlisle, and comprises one burner for each furnace fitted over the top of the fire door. The oil is not used entirely alone, but in conjunction with a small coal fire. The oil is contained in a 25-ton tank, and flows to the burners by gravity, being sprayed into the furnace by steam jets. The work of conversion was carried out by the Corporation staff. The oil fuel has enabled the tramway department to maintain the ordinary weekday service, and to resume the Sunday service, which had been stopped. Mr. Simpson is unable to give any reasonably accurate estimate of the relative costs of coal and oil. As to whether the plant will be retained after the strike, he says much depends on the price of oil.

IPSWICH.

At the power-station of Ipswich Corporation Electric Supply and Tramways Departments, oil fuel is being used as an auxiliary to coal. Burners have been fitted to one of the water tube boilers, with the result that sufficient coal has been saved to enable the normal 12-minute service of cars on weekdays to be restored. Previously there had been a 15-minute service. The chief engineer and manager, Mr. Frank Ayton, finds that with such an auxiliary installation as he is using no direct financial gain is to be expected.

SHEFFIELD GLASGOW.

Oil is being partially used at Neepsend and Kelham Island power-stations of Sheffield Corporation Electricity Department, which supplies the tramways among other purposes. After having made successful experiments in the use of oil fuel, the Glasgow Corporation Tramways Department brought the first converted boiler into operation on June 6 at the Pinkston power-station.

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LEEDS.

Since the preceding pages were printed we have received the following description of the oil fuel installation of Leeds City Tramways from Mr. J. B. Hamilton, the general manager.

The boiler plant at the Leeds City Tramways generating station, Crown Point, consists of nine Lancashire boilers, 30 ft. by 8 ft. 6 in. Seven of these, and occasionally eight on peak loads, are required to run a 3,000 KW. turbo-alternator which supplies the main portion of the tramway load. The normal weekly consumption of coal was approximately 400 tons. The Tramways Committee, at the beginning of May, decided to cut down this consumption owing to the scarcity of coal; seven of the boilers were therefore converted to burn oil fuel in conjunction with any coal available, such as slack, smudge, coke breeze, etc.

The oil burner adopted was that of the Gretna Engineering Company. This burner is one of the steam jet type, and was selected chiefly owing to its simplicity and the rapidity with which it could be erected. The oil is fed by gravity from tanks outside the boiler-house to the burner, first passing through a combined heater and water separator and then through a filter. Immediately before issuing from the nozzle of the burner the oil is split up and atomised by an injection of steam, the resultant spray being projected into the furnace and producing a bluish swirling flame which impinges on a bricked-up back about seven feet from the front of the furnace. A 4 in. depth of fire is maintained on the firebars.

The work was done by the tramways staff with the expert assistance of an erector from the Gretna Engineering Company, and under the supervision of the power station superintendent. The process of conversion went on continuously by day and night, and within five days from the commencement on May 5, two of the boilers were in operation and the remainder were in service within the following three days.

Owing to the coal shortage, the car service had been reduced over 50 per cent. during the first week in May, but starting with oil burners on May 9, the service was gradually increased until practically a normal one is now being maintained, except for a slight decrease owing to slackness of trade, closing down of works, etc.

A number of tests have been carried out during the time the oil burners have been in use, and the results so far have been satisfactory, insomuch that it has been decided to instal several more burners so as to cease firing with coal. In this case the Mechanical Brake Company, of West Bromwich, are supplying their burners.

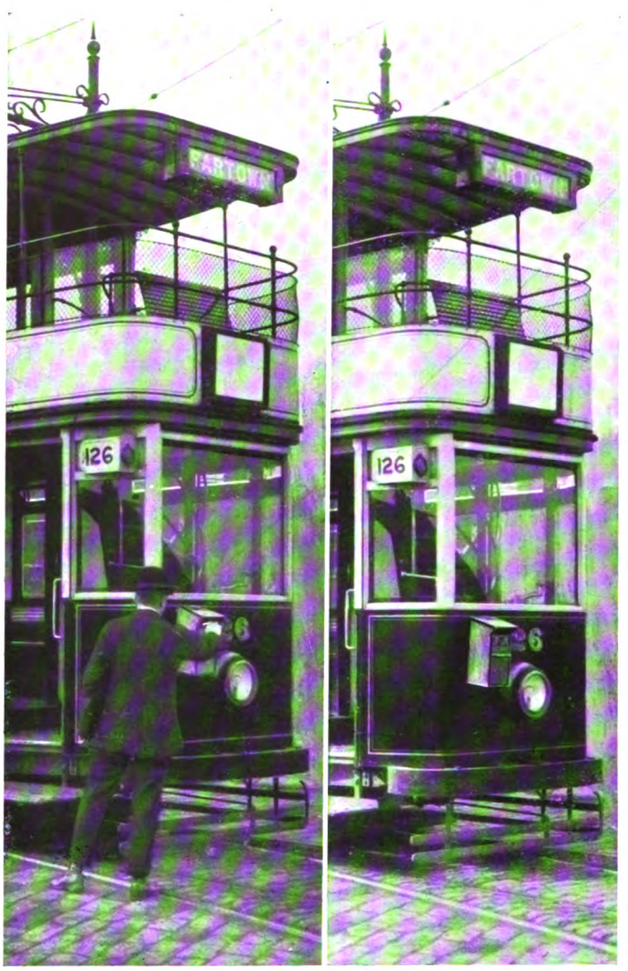
It will be understood that it has been very difficult to arrive at results which would be comparable with any costs for normal times, owing to the defective qualities of the coal now available. The calorific value of the coal used before the conversion to oil fuel was 13,000 B.T.U., whilst from analysis the corresponding value of the present coal slack is only 9,396. The calorific value of the oil appears to be very high, analysis giving 19,980. It may be added that the sample of coal slack sent to the analyst was above the average, and also that coke breeze is being used.

No decision has as yet been arrived at by the Tramways Committee regarding the permanent use of oil fuel; but this will no doubt be considered later, when more extensive use of this fuel has given further data, and the price of coal, following the adjustment of wages, etc., has reached its uniform selling rate.

HUDDERSFIELD CORPORATION TRAMWAYS

A REMARKABLE RECORD OF MUNICIPAL ENTERPRISE AND PROGRESS.

Huddersfield, where the managers' section of the Municipal Tramways Association are to hold their annual conference on the 22nd and 23rd of this month, is a manufacturing town in the West Riding of Yorkshire whose industrial activities are too well-known to require reproduction here. Its woollen and worsted textures are world-famed, and rank amongst the most valuable on the market, whilst its participation in the nation's bid for independency of German dyestuffs, resulting in the production in enormous quantities of T.N.T., picric acid and tetryl, coupled with its extensive



Letter Box on Huddersfield Cars.

khaki manufactures, was a factor of considerable significance during the war.

There are few tramway undertakings in the country that can show such a remarkable record of municipal enterprise as Huddersfield, which was the first municipality to construct, operate, and develop its own system.

In 1879 the Corporation promoted a Bill in Parliament for powers to construct tramways, and an Act was passed in 1880. Construction commenced in 1881, and as efforts to lease the lines were unsuccessful, the Corporation decided to operate the tramways themselves, and the necessary powers were obtained from the Board of Trade.

It was decided to adopt steam haulage, and an engine

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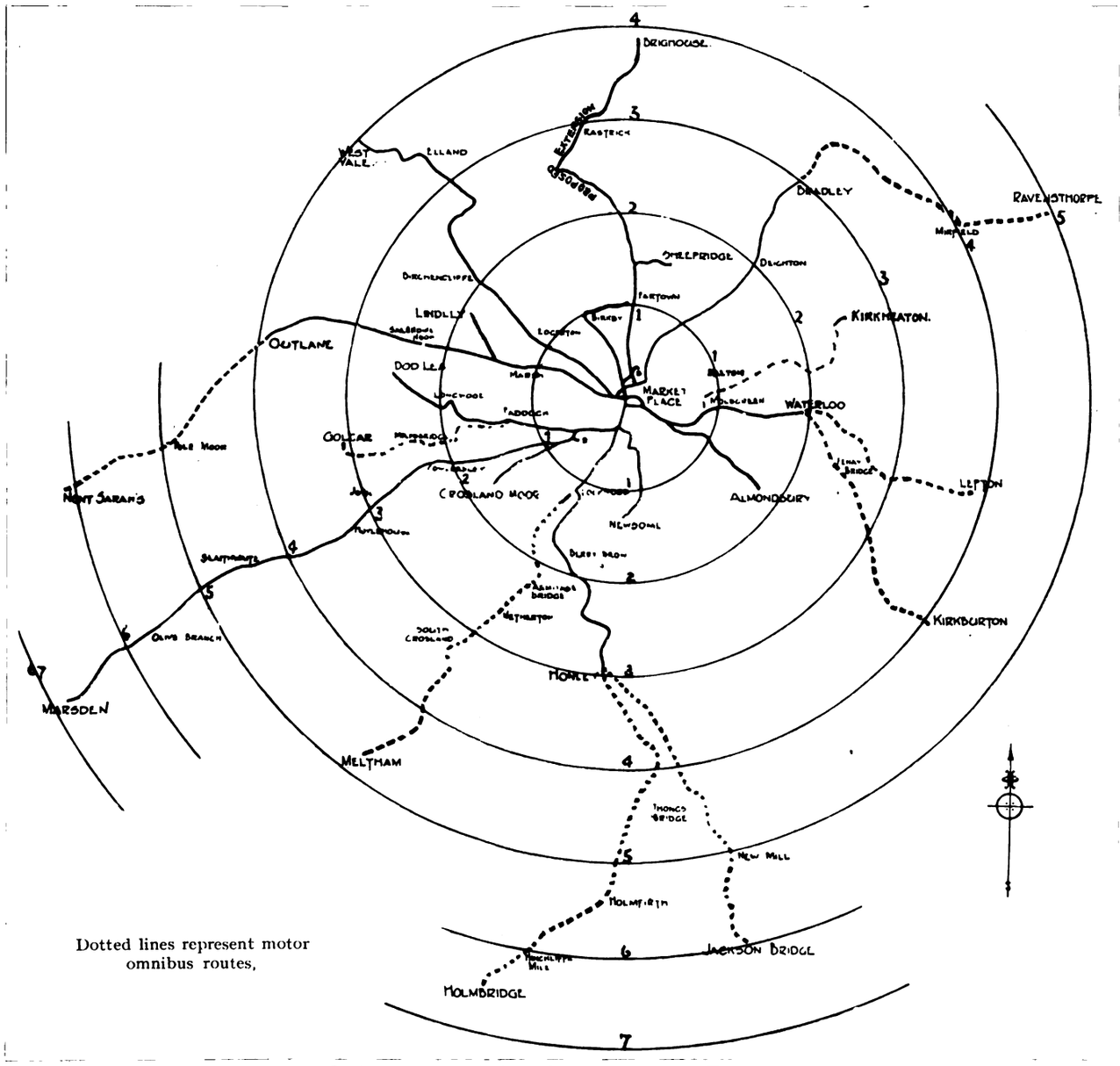
and car which had a trial run on November 13, 1882, was considered satisfactory, with the result that six additional engines and cars were purchased. The first engine and car ran for passenger traffic on the Lockwood section on January 11, 1883, and other sections were opened shortly afterwards.

The tramway depot, a large wooden structure in Northumberland Street, soon became insufficient to accommodate the rolling stock, and a new depot was erected in Great Northern Street.

to extend the tramway system into that district. Eventually a joint application was made to Parliament—the Linthwaite Urban District Council obtaining powers to construct tramways, and the Corporation powers to operate them. The line was opened on May 21, 1900. In 1902 the tramways were extended to the Urban Districts of Honley.

The extensions of the tramways into outer districts raised the question of providing additional rolling stock. The Tramways Committee decided not to



Dotted lines represent motor omnibus routes.

Outline Map of Huddersfield Corporation Tramways.

In 1897 the Corporation made application to Parliament, and obtained absolute powers for working the tramways. After the trams had been running a few years, it was found necessary to replace the four-wheeled cars with larger cars of the bogie type, and the engines were replaced by engines of locomotive type. The increased traffic began to have a serious effect on the permanent way, and in 1891 the general reconstruction of the permanent way was commenced, and completed at the end of 1893.

In January 1898, the Corporation were approached by the Urban District of Linthwaite, and requested

purchase any more engines and cars, but to convert the whole system to electric traction. The work of conversion commenced in 1899, and was completed in 1902. The power-station was erected at Longroyd Bridge, and the electric service commenced to run in February, 1901. The Corporation completed negotiations with the Linthwaite Urban District Council for the purchase of the Linthwaite tramway track, and in 1913 Parliamentary powers were obtained for further extensions, which included lines to West Vale and Marsden. The West Vale extension was the means of linking up the Huddersfield Corporation Tramways

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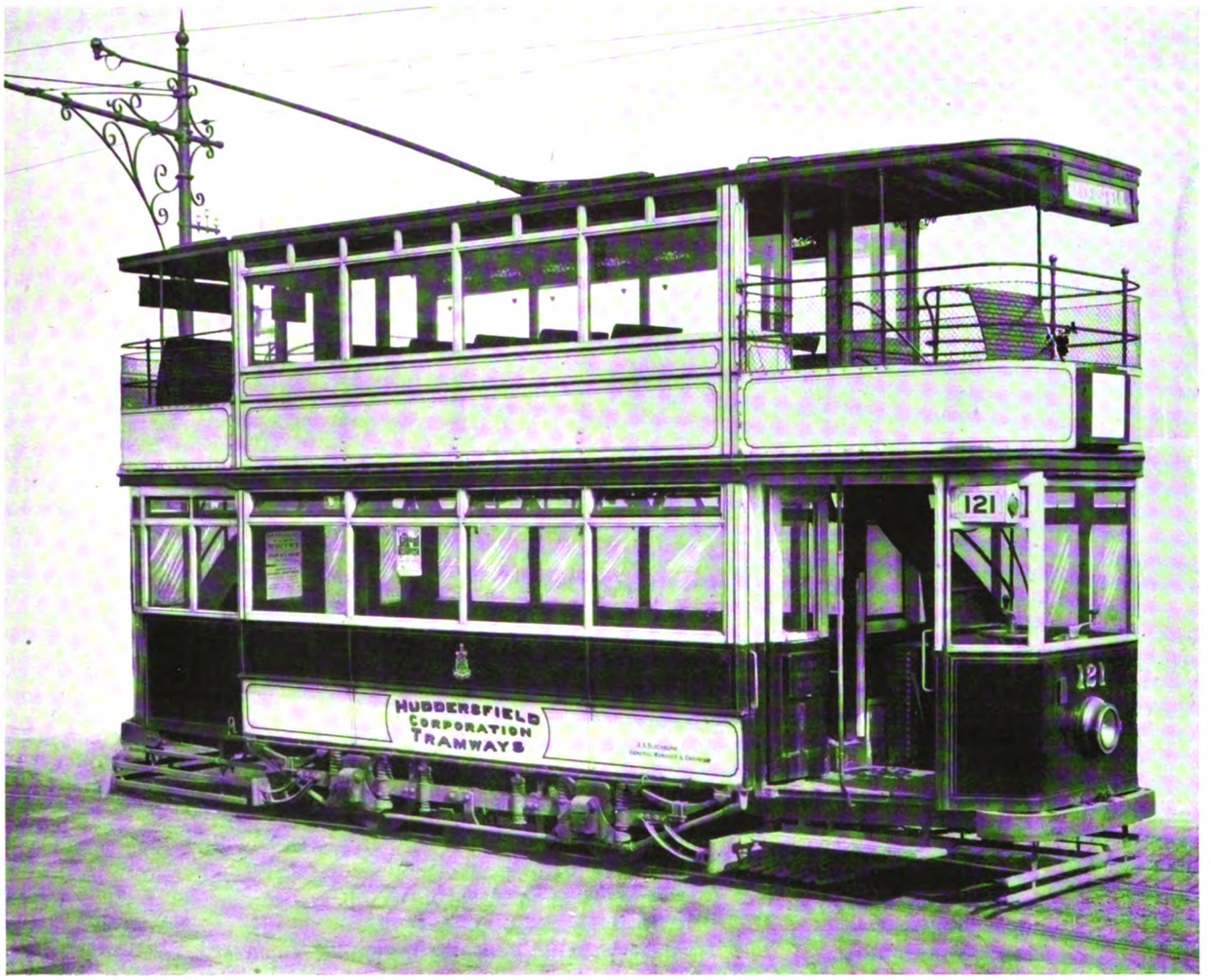
with the Halifax Corporation Tramways. Marsden, the longest route, is seven miles from the centre of the town, serving a population of 6,000, and is largely patronised by pleasure parties proceeding to the popular Marsden Moors—a picturesque expanse of bracing Yorkshire moorland which extends to the Lancashire boundary.

The haulage of coal along the tramways by means of specially designed trucks was commenced in 1904, as the result of arrangements with a manufacturing firm two miles from town, for the conveyance of coal from the Hillhouse railway sidings to their works. The system has been extended, and two other mills are converted into the standard type in 1914 at the Great Northern Street car works by the staff. The department also possesses two motor tower wagons.

Letter-boxes are attached to the cars, and are cleared by the postal authorities every hour from 9 a.m. to 8 p.m. on ordinary days, and on Sundays one clearance is made at 7 p.m. The utility of these boxes and the advantages afforded to the public can well be realised when it is stated that in one week over 20,000 letters are collected from this source.

The Corporation were last year successful in promoting in Parliament a Bill for the extension of the tramway system to Brighouse, and to run motor



Huddersfield Corporation Standard Car.

now being served. The quantity of coal carried during the twelve months ending March 31, 1920, was 11,945 tons, yielding a revenue of £1,557.

The passenger rolling stock consists of 126 cars, 70 of which, with seating accommodation for 58, were supplied by Messrs. Milnes, Voss and Company and the British Electric Car Company. The later 56, all of the single truck vestibule type and seating 62, have now been adopted as of the standard design, and were all supplied by the English Electric Company, Limited. The first six of these were delivered with uncovered fronts, one of which, No. 76, of the "Kavanagh" type, has already been described in these pages. These six cars were covered in and

omnibuses in conjunction with the trams to the districts of Golcar, Meltham, Mirfield, and Ravensthorpe; Lepton, Kirkburton, Holmfirth, and Holmbridge; New Mill and Jackson Bridge. One double-deck and four single-deck motor omnibuses mounted on "Karrier" chassis have already been purchased, and these are being put into service on the several routes.

A new car depot, capable of accommodating 100 cars, in St. Thomas's Road, Longroyd Bridge (adjoining the tramways power-station and motor garage) is nearing completion, and will be available before the end of the month. It is intended to make this the general running shed, so that the car works at Great Northern Street may be extended and equipped with

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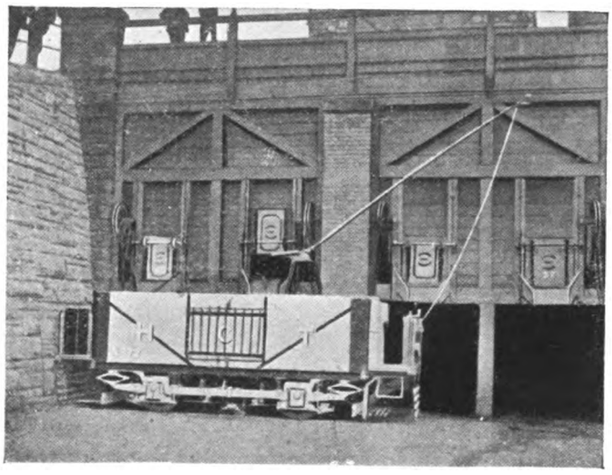
the necessary plant to construct additional rolling stock. Practically the whole of the machinery is already to hand and awaiting erection, when the conversion of the old type to the new standard type of car will primarily be proceeded with. Since the present general manager and engineer, Mr. A. A. Blackburn, was appointed in 1919, one car, No. 60, has been so reconstructed.

Operating a very hilly district as they are, on variations of altitude between 200 and 900 feet above sea-level, Huddersfield has good reason to be satisfied with the running and maintenance costs in relation to the receipts, as may be seen in the appended summary of financial results, and although, of course, along with all other tramways the adverse conditions of the past few years have been keenly felt, yet it has only been necessary to increase the passenger rates of fare by 50 per cent.—33 per cent. in July 1918 and 17 per cent. in June 1920.



Huddersfield Tramway Coal Wagon.

The total street length is 35·16 miles. Of this 21·85 miles are double track and 13·31 single track, giving a total length of 57·01 miles. The maximum gradient is 1 in 9, and the sharpest curve of 35 ft. radius. The gauge is 4 ft. 7¾ in. All extensions and track reconstruction since 1913 have Thermit welded joints, and since May 1917 the life of old rails hammered at the joints has been considerably prolonged by the process of electric arc welding.

A few months ago twelve office clocks and a large outside three-faced clock were installed at the General Office, John William Street, and these are regulated by one master on the pulsynetic electric system. At the same time a most up-to-date wireless receiving set, designed by the general manager's son, was installed to enable an accurate check to be kept on the master, independently of any outside source, by means of the time signals given out each morning at 11 a.m. (summer time) from Eiffel Tower. A proposal to synchronise with this master three of the largest and most important public clocks in the town is now under consideration, when the variations of time at present so apt to occur will be rendered impossible.

Huddersfield has considerable scope for expansion of its tramways, and although the present costs of construction do not admit the practicability of further tramway extensions, the Tramways Committee, over which Mr. Alderman E. H. Sellers, J.P., ably presides, and their general manager and engineer, Mr. A. A. Blackburn, are endeavouring efficiently to meet the growing demands of residents in the outlying districts by motor omnibuses, and notable developments in this direction may well be expected in the near future.

The following is a statement of the amounts contributed to and received from the rates by tramways departments :—

Year ending.	Surplus.	Deficiency.	Equivalent to Rate in £.
	£ s. d.	£ s. d.	Pence.
August 31, 1882... ...	—	671 4 4	$\frac{5}{8}$
,, 31, 1883... ...	—	1,336 12 8	$1\frac{1}{8}$
,, 31, 1884... ...	—	3,566 16 9	3
,, 31, 1885... ...	—	1,844 18 4	$1\frac{1}{2}$
,, 31, 1886... ...	—	3,493 8 3	$2\frac{3}{4}$
,, 31, 1887... ...	—	2,633 0 9	2
,, 31, 1888... ...	—	3,168 5 9	$2\frac{1}{3}$
,, 31, 1889... ...	—	151 12 7	$\frac{1}{9}$
Seven months ending			
March 31, 1890... ...	—	648 4 4	$\frac{1}{2}$
,, 31, 1891... ...	—	1,609 3 8	1
,, 31, 1892... ...	—	3,636 4 2	$2\frac{1}{4}$
,, 31, 1893... ...	—	8,092 3 0	5
,, 31, 1894... ...	—	6,398 2 0	4
,, 31, 1895... ...	—	3,989 10 0	$2\frac{1}{2}$
,, 31, 1896... ...	—	—	—
,, 31, 1897... ...	—	—	—
,, 31, 1898... ...	827 16 8	—	$\frac{1}{2}$
,, 31, 1899... ...	—	—	—
,, 31, 1900... ...	—	—	—
,, 31, 1901... ...	—	—	—
,, 31, 1902... ...	—	5,209 0 0	3
,, 31, 1903... ...	—	12,235 0 0	7
,, 31, 1904... ...	—	8,873 0 0	5
,, 31, 1905... ...	—	5,485 0 0	$3\frac{1}{16}$
,, 31, 1906... ...	—	—	—
,, 31, 1907... ...	5,025 17 4	—	$2\frac{3}{4}$
,, 31, 1908... ...	6,514 1 5	—	$3\frac{1}{2}$
,, 31, 1909... ...	2,061 10 3	—	$1\frac{1}{16}$
,, 31, 1910... ...	6,807 6 8	—	$3\frac{3}{16}$
,, 31, 1911... ...	6,458 6 9	—	$3\frac{5}{16}$
,, 31, 1912... ...	6,481 0 0	—	$3\frac{1}{4}$
,, 31, 1913... ...	6,590 0 0	—	$3\frac{1}{4}$
,, 31, 1914... ...	6,662 0 0	—	$3\frac{1}{4}$
,, 31, 1915... ...	8,400 0 0	—	4
,, 31, 1916... ...	8,600 0 0	—	4
,, 31, 1917... ...	8,800 0 0	—	4
,, 31, 1918... ...	6,750 0 0	—	3
,, 31, 1919... ...	7,050 0 0	—	3
,, 31, 1920... ...	—	—	—
	£87,027 19 1	£73,041 6 7	

Contributions to rates exceed rates in aid by £13,986 12s. 6d.

"THE AGES MEET."

At the summer exhibition of the Royal Academy of Art, visitors interested in modern tramways are likely to be arrested by the oil painting "The Ages Meet," the work of Mr. Stanhope A. Forbes, R.A. It is a night scene on the Thames Embankment. In the foreground is a gang of workmen engaged treating the tramway rails by the "in situ" process, and beyond the lurid glare which the operation creates can be seen the gloomy silhouette of Cleopatra's Needle with its accompanying mystic figures at the base. The contrast between the active, intent forms of the workmen clustering round their modern apparatus and the silent representatives of Egyptian civilisation is vividly depicted and aptly suggestive of the title.

Judge and Tramway Driver's Duty.—An important decision with regard to the emergency stopping of public vehicles was given in Shoreditch County Court by Judge Cluer. The plaintiff in the action claimed £100 damages from the London County Council for personal injuries, alleging negligence by a tramcar driver. His case was that he mounted to the top of the car when it was in motion, and the driver pulled up with the emergency brake, throwing him over the back of the seat. The car restarted suddenly, throwing him to the floor. The driver said a woman suddenly ran in front of his car, and he had to pull up with a jerk. The judge held that the driver had not been negligent, as he was bound to pull up to save life; in fact, it was his duty to do so. He also held that the restart was in order, and gave judgment for defendants.

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STEEL-TIRED TRAMCAR WHEELS.

Since 1904 the British Griffin Chilled Iron and Steel Company, Limited, have supplied for use on tramways in the United Kingdom and in the Colonies large numbers of steel-tired tramcar wheels, fitted with their special toughened and annealed semi-steel centres. These wheels have given highly satisfactory results in service.

Steel-Tired Tramcar Wheel.

As is well known, the chief requirement of a wheel centre is that it should be able to stand a high compression, so that the tire may be shrunk on efficiently. When this result has been achieved, there is no necessity for the use of set-screws, which always prove a source of weakness both to the tire and the centre. The chief advantages claimed for the British Griffin centres are that they are capable of withstanding a very high compression, and much more than is necessary safely to secure the tire; no set-screws or retaining rings are required; the centres retain their original shape, so that re-tiring is made comparatively easy; and no difficulty is experienced in expanding the worn-out tire from the centre.

RIVALRY WITH STOKE TRAMWAYS.

COACHES RUN IN COMPETITION.

For some time past a Tunstall firm of coach proprietors have been running in competition with the Hanley-Burslem tramway route of the Potteries Electric Traction Company, the Stoke-on-Trent Watch Committee having granted licences.

According to the *Birmingham Post* the coaches ran a service at the same twopenny fare, covering the distance in six or seven minutes, instead of in the fifteen to twenty minutes occupied by the tramcars. As the result was that the cars were patronised by a mere handful of passengers, the company put on a fleet of omnibuses to compete against the Tunstall firm. There followed a week of frantic competition. It provided entertainment for thousands of the workless people of the Potteries, and the frequent bursts of cheering as the private coaches departed laden with passengers showed clearly in which direction lay the popular sympathy.

The position the Watch Committee will be called upon to deal with is a difficult one. It appears that the tramway company for a number of years have had twelve licences, annually renewable, to ply for hire with omnibuses within the borough, but they have never before attempted to run on the Hanley to Burslem route, or on any portion of the main line of tramway in the Potteries.

The Watch Committee have declared that they will deal with the question of licences without giving preference to anyone. Meanwhile the competitors of the tramway company announce their intention of placing first-class and third-class saloon omnibuses on service on the principal routes of the Potteries within a short period.

At the annual meeting of the Potteries Electric Traction Company, held in London on May 20, the chairman of the company, Mr. R. J. Howley, who presided, mentioned that he had addressed a letter to the local Corporation in regard to "pirate competition" by licensed vehicles with the regular services worked by the company. This competition had developed considerably during the year, owners of motor coaches and similar vehicles finding work for their vehicles by sending them out to ply for hire over the tramways. He was satisfied that in the long run the competition would be overcome, but the problem was not an easy one.

AUSTRALIAN SAFETY MEASURES.

The New South Wales Legislature, in consequence of representations made by the Newcastle Municipal Council, have introduced into the traffic ordinance a provision to prevent a person riding, driving, propelling, or using any animal, vehicle, or machine in a public place, from passing on the left or near side of a tramway car for the time being stopped for the purpose of taking up or setting down passengers, until the roadway was clear of persons entering or leaving such car. It is proposed, however, that an animal, vehicle, or machine may be ridden or driven on the right or off-side of a car, if the roadway is sufficiently clear. The regulation is to apply to municipalities only.

MANCHESTER STREET TRAFFIC.

REJECTION OF THE CORPORATION'S PROPOSAL.

The Manchester Corporation General Powers Bill came before a Select Committee of the House of Lords on May 14, the Earl of Wemyss presiding.

On the clause which sought to give power for the making of by-laws, subject to the approval of the Home Secretary, to regulate street traffic, Ald. Ashton stated that the manner in which motor cars passed tramway cars when stationary was disgraceful.

Mr. Thomas, representing the Manchester Committee of Road Users' Association, said they had drafted a clause which he thought might meet the opposition. It was that the Corporation might make by-laws requiring drivers of slow-moving vehicles to keep their vehicles as far as was reasonably practicable to the inner or left side of the street.

Lord Wemyss, at the conclusion of the case for the Corporation, asked the opponents if they were willing to agree to a clause providing that slow moving traffic should keep to the near side of the road, or if they would assist in framing other by-laws for the regulation of traffic. The committee, he said, were not in favour of giving Manchester all the powers asked for. The promoters and opponents of the Bill subsequently conferred with a view to coming to an agreement on an amended traffic clause.

Subsequently Mr. Tyldesley Jones, K.C., for the Corporation said the clause had been approved by the Corporation, and adopted by a town's meeting. They must leave the matter in their Lordships' hands.

The Committee were unable to agree to the clause.

Bills containing a similar clause have been promoted this session by Liverpool, Burnley, Preston, and Grimsby Corporations, but in no case has the clause been granted. In most instances it was withdrawn as the result of intervention by the Motor Legislation Committee. The discussion in one Lancashire town is reported to have resulted in the Tramways Committee being asked to give serious attention to a complaint made by the chief constable of obstruction caused by prospective tramway passengers.

GLASGOW EXPERIENCE OF THE REGULATION.

In the motor notes published in the *Glasgow Herald* on May 17 the writer says—"The regulation in Glasgow under which all wheeled traffic must stop immediately before a tramcar stopping place until the roadway is clear of passengers has been in operation for six years, and has never been seriously challenged. It is one of the most useful by-laws ever passed by the Corporation, and operates to the comfort and safety of the million and a half people who use the cars every day."

It is of interest to note that in the Glasgow Sheriff Court on May 19 the Sheriff gave judgment in an action for damages in which this by-law figured. It was brought by Mrs. Anne Irvine against the Caledonian Railway Company. The Sheriff stated that on November 23, 1920, the plaintiff, with her son, aged 5½ years, was a passenger on a Corporation tramway car proceeding to Cambuslang. The car drew up at a stopping-place near the junction of Dalmarnock Road and Springfield Road. Plaintiff alighted, and was lifting her son off the platform when a lorry or float belonging to defendants came up behind and attempted to pass between the car and the pavement. The wheel of the lorry passed over one of plaintiff's big toes, causing a compound fracture. Mrs. Irvine was confined to bed for two weeks The duty of the defendants' servant was to pull up and stop his lorry to allow passengers to be discharged from or be taken up by the tramway car. He failed to do so, in contravention of No. 10 of the Glasgow Corporation by-laws. Apart from the by-law, the defendants' servant was negligent in not keeping a proper look out and in attempting to make his way between the car and the pavement. The plaintiff was not guilty of contributory negligence. He therefore found the defendants liable to the extent of £35 and expenses.

The Metropolitan Municipal Tramways Council have forwarded to the Commissioner of Police a request that it be made an offence for vehicles to pass tramway cars which are stopping to take up passengers.

TRAMWAYS AND LIGHT RAILWAYS ASSOCIATION.

CONGRESS IN LONDON.

The council of this association have decided that in view of the coal crisis and other prevailing circumstances it will not revert to the pre-war arrangement of holding a two-day congress in the provinces. It has been decided, however, to hold a one-day congress in London, as was done last year, on the same date as the general meeting of the association. The meeting will be followed by a members' dinner in the evening. Friday, July 15, has now been fixed as the date of the congress, which will be held at Caxton Hall, Westminster, and the dinner at the Trocadero Restaurant.

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THE EDITOR will be glad to consider articles by experts. All information of a practical character relating particularly to the engineering and operating branches of transportation will receive prompt attention. Original illustrations will also be welcome.

LONDON, JUNE 16, 1921.

Oil in Power-houses. The experiences of various tramway managers and electrical engineers in the use of oil fuel at their generating stations, as recorded in the opening pages of this issue, will be read with interest. The coal stoppage has emphasised the need for an alternative fuel in a way that cannot be denied, and the experiments with oil will doubtless prove highly instructive, whether or not its use is permanently maintained. The question of the future adoption of oil fuel will, of course, be governed to a large extent by its relative cost compared with coal. Until prices have become more stable, and fuller experience has been gained, a fair comparison between the two methods of firing can hardly be attempted. It should also be remembered, when considering the economical results obtained at present, that the existing emergency creates special factors which would not operate in normal times. For instance, though oil costs about one-and-a-half times the pre-strike price of good coal, the relative expense of oil fuel stoking can only be equitably decided by reckoning the "strike-price" of coal—where it is available. Even then a margin must be allowed for the inferior calorific value of the coal received after the strike had begun. At Hull, where the oil plant was brought into use at an early stage, the cost of fuel per unit generated is 1·223 pence for oil and 0·860 pence for coal only. Mr. Rayner is justified in considering this result very satisfactory, especially bearing in mind the loss which would have been entailed by the cessation of the tramway service. As regards the cost of labour in handling the respective fuels, the advantage undoubtedly lies with oil, though the extent of the saving will vary considerably according to the method of handling the coal. In small generating stations, where hand stoking has been the rule, oil should easily hold its own though in the larger power-houses, with mechanical stokers, the economy in handling costs will not be so marked. In the case of Blackpool, where an auxiliary oil burning equipment was provided for before the miners' dispute began, Mr. Furness considers that unless the price of coal falls below £3 per ton it will probably be to the advantage of the Corporation to maintain the use of oil. After all, the coal trouble may prove—we would not say a blessing in disguise—but a means towards the fuller recognition of this other great source of power. There is little doubt that oil will become cheaper as new fields all over the world are exploited. As a stand-by, and a means of coping with peak loads, oil fuel seems to have definitely asserted its utility. At any rate, if it can be relied upon to protect public services and industry generally from sudden dislocation, its advent is truly welcome.

Defence of Public Services. Both municipal authorities and companies engaged in providing public services ought to take to heart the chief lesson arising from the coal difficulties. It is that they must be prepared to take steps to secure as far as possible the continuance of their services when threatened by labour troubles. In taking such action they have the example of the Government's preparations for supplying the vital needs of the nation when the railway and transport workers threatened to side with the miners. That voluntary helpers can successfully cope with attempts to hold the nation and private

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enterprise to ransom was shown by what was accomplished by motor transport during the railway strike towards the end of 1919, and also by the way in which the London Underground Railways carried on during a lengthy period of trouble with their employees. The success with which the directors and management of the latter undertaking met the difficulties confronting them is an object lesson for local authorities and private concerns. On that occasion all classes rallied in hundreds to work as stokers, drivers, and porters, and in a few days a good service of trains was running. Prompt action of this nature is the best antidote to the threats of extremists at all times. There would have been ample justification for the London County Council following this procedure if the hot heads had succeeded in their purpose of bringing out the car hands in support of the power-station men who had refused, out of mistaken sympathy with the miners, to handle imported coal. With the aid of ratings from the Navy and of voluntary labour the trouble at Greenwich was successfully overcome, and in future the public will expect that voluntary workers shall be resorted to in the event of a strike of any section of public employees. The time has passed when London's huge population will stand calmly by and permit their means of transportation to be held up by one union or any combination of unions.

Fares on One-man Cars.

The article which we print in another column on the subject of graded fares for one-man cars contains some practical suggestions for dealing with this important question. The adoption of the single operator principle on tramway systems in this country has long been urged in these pages, and when ultimately it comes to be tried—as we are confident it will—the problem of fare collection will naturally call for solution. The chief difficulty lies, of course, in the fact that our graded fares present more difficulties than the flat rate, or universal fare system, so common in the United States and Canada. In fact it was this single-fare principle that played an important part in extending the adoption of the one-man car in America. Statistics make it clear that this type of vehicle has come to stay, and we cannot doubt that its characteristics of economy and safety will before long be given tangible recognition in the United Kingdom. That the use of sectional fares is not incompatible with the one-man car is proved by the combination of the two already effected in some American towns. Our contributor, in the article referred to, deals with certain drawbacks to both the "pay as you enter" and the "pay as you leave" systems, which involve, on the one hand, delay in embarking passengers, and on the other an inefficient check on the fares taken. He goes on to explain what he describes as a happy medium between the two methods, and though the scheme he sets forth betrays certain weaknesses, it has much to recommend it, and at least forms a basis on which the problem can be approached. The idea of saving time by the provision of an automatic ticket machine at car stopping-places might well serve its purpose—as the writer suggests—in the case of passengers actually *waiting* for a car; but we imagine that the number who would invariably arrive hurriedly at the last moment and board straight-away would constitute a formidable exception. It is such exceptions that upset many otherwise excellent schemes. Although provision is made for the payment of such passengers' fares on the car, this very fact might encourage a tendency to ignore the existence of the ticket machine in the roadway. Whatever policy is decided upon, this human factor must not be overlooked.

Linking of Tramway and Omnibus Routes.

Considering the extent of the task involved in the promise of the London General Omnibus Company to the House of Lords' Committee, good progress is being made in the work of providing connecting services with the County Council tramways. The second such facility is about to be brought into operation, namely at the Charing Cross stop of the Embankment tramways. Nearly two months ago the Westminster City Council agreed to the omnibuses using Northumberland Avenue for that purpose, but the police took objection to the huge vehicles turning at the Embankment end of the thoroughfare. The actual reason for the objection has not been made public, but it is undoubtedly due

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to the fact that at this point a great deal of fast and heavy motor traffic comes off the Embankment, from both east and west, into Northumberland Avenue. Therefore to allow omnibuses to turn from the down into the up division of the Avenue would not only lead to obstruction, but would place danger in the way of both vehicles and pedestrians. As a result of the police ban, the omnibuses are to be given a still better route for obtaining patronage, for the Westminster Council and Scotland Yard have agreed that they shall be permitted to turn from Whitehall into Horse Guards' Avenue, thus passing the War Office and the Junior Army and Navy Club before coming out on to the Embankment to enter Northumberland Avenue. At the latter point passengers will be taken up from the cars, and there should also be a good deal of traffic forthcoming from clubs and hotels in the vicinity of Northumberland Avenue. The good effects of this link between the tramways and omnibuses should also be seen in a lessening of the congestion of the foot pavements at the Strand side of Trafalgar Square, where the stopping places of numerous omnibus services render it difficult for pedestrians to pass along. This is not the only point where the buildings on one side of the thoroughfare should be set back and the road and pavement widened. For years the neighbourhood of Victoria Station has been inadequate to the needs of the traffic, and little or no relief has been afforded by the Brighton Railway Company some years ago permitting the omnibuses to use the yard in front of the station. The need here is for a clearance of the whole of the shop premises on the south side of the short thoroughfare between Victoria Street and Buckingham Palace Road. With the large open space that would then be available, the omnibuses would be provided with an adequate terminus, while the tramways would be able to avoid the dead end at the junction of Victoria Street and Vauxhall Bridge Road by the construction of a loop to the east side of the station and into Vauxhall Bridge Road via Warwick Street. In improvements vital to its needs London moves slowly in comparison with provincial centres.

U.S. ELECTRIC RAILWAY PUBLICITY.

USEFUL WORK OF NEW DEPARTMENT.

The value which the American Electric Railway Association places upon publicity concerning its traffic problems, and the steps which it is taking to deal with the matter, are the subject of editorial comment in the *Electric Railway Journal*, of New York. The work is in the hands of the advertising section of the Bureau of Information and Service, and the journal describes this department's activities as one of the most constructive pieces of work yet accomplished by the association as a whole. "The advertising section," it says, "is the correct answer to the question, 'How shall the association handle railway publicity?' In other words, the association is now organised to speak authoritatively to the public—to put the best thought of the industry into bringing out the public's problem from the public's point of view, as real news matter. And the advertising section is doing the job.

"This section is organised for the purpose of providing a news service to newspapers and any other legitimate publicity medium in the effort to get the true story of the electric railway business before the public, for it is with the public that the railways do business, and in their hands, in the final analysis, rest the restrictions and privileges under which the railways have to work. Further, and even more important, perhaps, this section must open up the channels to these publicity mediums so that the copy is used, and must establish a confidence that the material furnished is legitimate, correct and real informative news, not propaganda. Another function of the section is to make a study of possible new methods of railway publicity. The movie is one example of this, and the news films were busy on Electric Railway Day, May 4.

"Naturally the success of any such programme depends largely upon the personality of those handling the work. The important fact about the present situation is that not only has the association adopted the right method, but it has apparently found the right man to carry it out. That the section has been accomplishing results of real value to the industry is shown by the story of its work to date. Most companies have concrete evidence of some of this work in their own local press. The work now in hand and planned for the near future is of a most valuable nature, and will doubtless have a real and far-reaching effect. There has been more useful railway publicity in the past few months since this section was organised than the railways have had in the same number of years, and more of it is to come. . . . The association needs and merits support in this publicity activity."

MUNICIPAL TRAMWAY MANAGERS.

PROGRAMME OF HUDDERSFIELD MEETING.

The annual meeting of the managers' section of the Municipal Tramways Association will be held at the Town Hall, Huddersfield, on June 22 and 23. It is expected that representatives of about 85 undertakings will attend.

On the opening day (Wednesday) the delegates will be welcomed by Alderman E. H. Sellers, chairman of the Tramways Committee, and other members. Included in the programme of the meeting are discussions upon "Railless Traction, with Special Reference to Front Drive," by Mr. J. Steven Hamilton, chief assistant engineer, Leeds City Tramways, and notes on "Railless Trolley Traction," by Mr. R. H. Wilkinson, general manager of the Bradford City Tramways. Other subjects suggested for discussion are—One-man cars; statutory powers to operate motor omnibuses; track construction in the light of present day conditions; car design and construction, especially in the direction of reducing unloaded weight; and fuel oil—recent experiences.

Members will be entertained at luncheon by the Mayor (Alderman Woolven) and the Corporation, and at tea by Mrs. Robson, wife of Mr. W. Tuke Robson, late general manager of the Southampton Corporation Tramways, now of High Flatts, Penistone.

After the conference on Thursday morning, Alderman Sellers and Councillor Canby, chairman and deputy chairman of the Tramways Committee, will entertain the members at luncheon, and in the afternoon excursions will be made to Harrogate and Knaresborough, Karrier Motors, Limited, Huddersfield, providing the motor conveyances. Near Bradford the latest type of railless vehicle will be inspected, and on the return journey a call will be made at Leeds to inspect, if completed, their latest type of railless vehicle.

The Associated Equipment Company has established a large repair depot at the junction of North Road with Caledonian Road, London, N.1. The shops are equipped on thoroughly up-to-date lines.

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GRADED FARES FOR ONE-MAN CARS.

By Faregetter.

During the past several years the American technical press has afforded undeniable proofs of the practical benefits derived from the use of the one-man car. Operating statistics issued by the several hundred tramway companies using these cars conclusively show that the one-man safety car in America is an accomplished fact. The single-fare system in vogue without doubt aided vastly the adoption of a car now so generally in use.

Many tramwaymen in this country have been deeply impressed with the merits of the car, only to anticipate difficulties in its adoption here, due to the graded system of fares, number of coins, change, etc. It is argued that a single operator to attend to motorman's duties and also act as cashier under the British complicated system of fare collection is impossible. It may be generally conceded that the present system of cash fares in this country, with its variable stage amounts, ticket selection—punching and delivery—the necessity for frequent change, coppers for the several denominations of silver pieces, would so burden a one-man operator at stopping points as seriously to slow up schedules.

In the confident prediction, however, that these one-man cars will inevitably find extended use here, the writer of these notes has devoted considerable attention to graded fares for one-man cars, and in the process has evolved several schemes which are set out below.

The issue and receipt of a ticket on cars here is an institution. It possesses the vital element of a definite record to the management of the money handed over to the collector and the variable sums of each fare. Tickets were therefore regarded as a *sine que non* in building up this one-man fare system—in conjunction with a machine that would act as both a ticket deliverer and coin holder.

"Pay as you enter" was the initial step in the scheme, passengers depositing correct coins in the glass box of the machine installed at the front entrance. The motorman operated a disc of numerals, bringing a *number* to a point coinciding with the amount of the fare. This would be in line with a *letter* indicating the stage at which the passenger entered. A plunger-rod printed both numeral and letter on the ticket and issued it through a slot in the box. Further consideration of the scheme went to show that "pay-enter," with a flow of entering passengers, would tend to be somewhat slow in the series of operations required, and cause irritation amongst the waiting passengers standing in the roadway—particularly in wet or cold weather.

A review of the principles of "Pay as you leave," which had been actually adopted on a graded fare system in America, indicated great possibilities. It meant a quick flow of passengers into the car, avoiding the wait in the inclement weather, as in "pay-enter." The *modus operandi* took the form of a coloured disc handed to each passenger by the motorman on entry, a different colour for each stage being used. The passenger retained the coloured ticket until his destination, and this token, handed back to the motorman with fare, enabled him accurately to check the fare and prevent over-riding, etc. Further, as passengers invariably alight along the route in one's and two's, the collection of fares on exit was not a factor tending unduly to delay the car—even when requiring change for silver, etc. On the other hand, no actual ticket was printed, punched or recorded, which exposed an evident weakness in this scheme. Whilst the passenger was carefully checked, there was no check on the motorman. He could turn in to the management only just an amount as would not too clearly indicate his pilfering proclivities. This system of pay-leave was abandoned with reluctance, as it was simple in operation, eliminated tickets, checked over-riding, and brought in *all* the fares from the passenger, accelerated entry and exit.

A happy medium between pay-enter and pay-leave systems was sought—affording all safeguards on passenger and collector, without delaying schedules. This system is now presented for criticism by your readers. In effect, it represents a combination of—

Pay-before-entry.
Pay-leave.
Season or contract tickets.

One has constantly to bear in mind that the motorman is the collecting agent. This added duty must be rendered as simple an operation as possible. In addition, this duty must under no circumstances tend to delay the schedules. With these primary facts in mind, a reasonable appraisement of the above scheme only is possible.

Pay-before-Entry.

What happens along your route? Small or large groups of passengers congregate at the stopping places, waiting for the cars. They may idle there one or more minutes. Utilise their time at this point in getting their fares, thus eliminating the time which would otherwise be occupied on the platform, and consequent delay to the car.

For this purpose a suitable automatic ticket issue machine is necessary at such stopping places. This machine would be sufficiently compact to mount on an adjacent line pole. Mechanism has been devised that will take any number of coins equal to the fare values on the route, and deliver a *metal* ticket bearing the amount of such fares. This, for example, may be either 1½d., 2d., 3d., 4d., 5d. or 6d. This token also is coloured to show the particular stage at which the ticket was obtained, or the point of entry, for checking purposes. With this metal ticket the passenger boards the car, and takes his seat. On leaving the car, the ticket is handed to the motorman, who checks point of exit with the amount shown on metal ticket, in conjunction with its colour. The machine will register the delivery of each metal ticket to the passenger, for record, and the motorman merely drops the ticket into a container for redistribution.

The passenger without the correct fare at the waiting stage can board the same car, hand the motorman a silver piece, receive a sealed packet containing coppers along with a coloured disc, and take his seat in the car. Just before destination he walks to a similar automatic machine near the motorman, drops the coins in the box, receives a metal ticket, this being handed over to the motorman along with the coloured disc.

It will be seen that the motorman is actually relieved of any cash receiving duties—he merely supervises the accuracy of the tokens given up. The work is really placed on the passenger. It is made easy for them, and the system once started, becomes automatically as simple a process as that in use at the present time. The machine will take all the coins at once, *i.e.*, there is no need to go through the slow process of inserting each penny in the slot. The coins are dropped in a

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glass box simultaneously, and the machine does the rest. This will speed up the scheme, should several passengers congregate at the machine when the car has stopped. At heavy loading points, such as termini, the machine will take care of the passengers, or alternatively they file past a special collector, who can give out both change and issue tickets.

With a heavy unloading, for example, at a terminus, a special collector can board the car at the preceding stage and attend to the collection of tokens, etc., before the car arrives, thus speeding up the exodus without delay to passengers.

Contract Tickets for Regular Riders.

Most tramway systems have a rush-hour period, usually mornings and evenings. A census would show that the bulk of these are regular riders coming from their homes to the centre of the city in the mornings, and returning in the evenings. The car is their daily form of transit between two definite points on the route.

Having in mind again that we are concerned in reducing or eliminating the labour of fare collection on the platform to save the time of the one-man operator, it would seem to be an appalling waste of energy and time to collect cash fares each morning and evening from a regular rider for say 600 times in the course of a year. Multiply this by the number of regular riders per car, and then ask the pointed question "Is all this repetition work necessary?" From the rider's point of view it certainly is not. Why should he be bothered on every daily ride between two regular points to find cash when a contract ticket purchased in advance and shown on entry and exit fills every requirement. From the collector's point of view it is so much wasted time and effort, which could be more profitably devoted to essentials, one of the most important of which is to keep the car moving.

Many tramways have tried seasonal or contract tickets, and for various reasons abandoned them. These were two-men cars, however, and as one of them had nothing else to do but to attend to fare collection, it cannot be argued that these contract or season tickets were adopted as primarily an aid to fare collection. Many were avowedly aiming at securing regular patrons by reduced rates against competitive forms of transit. Under these and similar conditions the revenue suffered to some extent, which caused many managers to view the system with disapproval. Admitting certain disadvantages in this respect, it will be evident that the contract ticket as applied to a *one-man* car possesses the vital prepayment feature which so greatly assists our object in saving platform labour in fare collections, and thus helps in the general scheme of bringing these one-man cars within the scope of economical operation.

In advocating contract tickets for regular riders, this implies a benefit to these riders as against casual riders. On principle, this can surely be upheld, since the regular rider may be likened to a wholesaler in other lines of business receiving a discount for his regular and larger volume of trade as against the incidental and low value buyer.

Assuming this may not be practicable in many instances, it would still be possible to induce regular riders to purchase contract tickets by a small rebate, which can easily be granted from the many savings to be effected on these one-man cars, without greatly impairing the financial revenue which records show these one-man cars are capable of producing.

If we can then assume that contract tickets are a very helpful feature of our fare collection scheme and are a practical possibility, it only remains to determine the method of their use for each system.

These may be in the form of weekly, fortnightly, or even monthly season tickets between two definite points on the route, available for certain hours of the day, coinciding for example with the rush-hour period. Printed in different colours for expiry dates, they give the motorman opportunity of checking by a glance. It might be considered advisable in some cases to give unlimited riding during the day—this to encourage the riding habit. Contract tickets, in the form of 12 or 24 tear-off tickets, each available for a certain value of ride, would possibly be the better form on other lines. These contract tickets would be shown on entry, and there would be no necessity for motorman to hand over the coloured stage disc for checking, since the ticket shown on exit is evidence of the correct alighting point. The tear-off tickets to be given up on exit could be deposited in a suitable receptacle as a daily record of these trips.

In this system of fare collection, the three methods employed, viz.—

Pay-before-entry,
Pay-leave,
Contract or season tickets,

are intended to be used in combination for those cities having a brisk traffic throughout the day, and it is designed to handle the heavy rush-hour periods. On small tramway systems, with a very light traffic, a machine on the car would probably take care of all the fares, eliminating the necessity for machines at each stage.

The scheme has, I think, all the elements of a watertight system, ensuring that *all* riders pay their quota, and *all* monies reach the management. In the definite knowledge of daily leakage in receipts under the present system, most managers will appreciate the latter point. It brings within the realm of practical politics, efficient handling of heavy loads by one man, without delay to passenger or operator, this in spite of the five or six different fares on a route. The bugbear of making change for the half dozen silver coins in circulation is rendered a simple "give and take" process, with speed a marked attribute. Note that the motorman is not a cashier-cum-motorman. He is not asked to become a skilled cashier, neither would he be under the apprehension of a wrong cash balance at the end of each day. These responsibilities and fears are avoided. Beyond the easily acquired knowledge of the fare stages (for checking purposes), his only added duties are completed with the issue and collection of the tokens. The occasional issue of change envelopes is too incidental to be regarded as an extra duty.

The foregoing general description of this proposed Graded Fare System for One-man Cars, it will be noted, avoids entirely the paper ticket system. This is a crude method at the best—open to disputes if the punched hole is not in register with the destination point—a very frequent occurrence. It involves a special business in itself to maintain the stocks of different fare tickets, is a substantial item of expense in the course of a year, and renders both the cars and stopping places untidy depositories for used tickets. Metal tickets cannot be mutilated or destroyed. They have a life as long as ordinary coins. It would be useful to have the views of your readers on the scheme proposed, with criticisms or suggestions.

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RE-ORGANISATION OF THE BERLIN TRAMWAYS.*

On October 1, 1920, the new Corporation of Berlin was formed. Eight towns and eighty-six parishes and manorial districts were brought within a single municipality, with a diameter of about 28 miles and a total population of almost 5,000,000 inhabitants. By reason of this combination the necessity arose of uniting the hitherto separately managed tramways into a single organisation controlled from one centre. By far the greatest of these tramway systems was the undertaking of the Greater Berlin Tramway Company, which celebrates its fiftieth anniversary this year. In 1918 the Berlin-Charlottonburg Tramways, the Western, the Southern, and the North-Eastern Berlin suburban lines were added to it; and in April, 1919, the Berlin Eastern lines were likewise absorbed.

The combined systems of the Greater Berlin tramways on October 1, 1920, had a track length of 574 miles. To this was added, in consequence of the formation of the municipality, the tramways system of the city of Berlin, measuring 43 miles of track, and the Berlin Electrical Tramway with 29 miles, the tramways of the town of Köpenick with 31 miles, of Spandau with 26 miles, and the commune of Heiligensee with 14 miles. At the beginning of April, after the conclusion of the negotiations with the Teltow district, the Teltow circuit tramways were also added, with a length of about 43 miles, whilst the working of the Schmöckwitz-Grünauer Bank Tramway with a line of 5 miles will soon be included in the Greater Berlin Tramway system.

The whole system, which now amounts to 775 track miles, is shown in the accompanying map. The rolling stock includes 2,580 motor cars and 1,800 trailers, besides a large number of locomotives, salt spraying wagons, and goods wagons. The united tramway systems are now known under the simple name of the Berliner Strassenbahn—the Berlin Tramways. This combination of various separately managed concerns necessitated a reorganisation of the internal system of administration. The economic pressure suffered by the separate tramway systems which became continuously more menacing during the last two years, and was indicated by the growing deficit in the monthly accounts, made it essential that the rather loose form of administration should be put on a sound commercial and technical basis.

Consequently, the management of the tramways was entrusted to two principal executives, with two directors—the one commercial and the other technical. The management itself will be under the control of an administrative council, which again consists in part of the chief traffic committee of the new municipality of Berlin. The city controller for traffic is at the same time President of the Administrative Council of Tramways. Both the commercial and the technical executives are divided into a number of independent sections with special section managers, superintendent engineers, to whom considerable discretion is allowed, and who are made responsible in every respect for the business results of the respective sections placed under them. A special department takes over the traffic section, which will be managed by a general inspector with three superintendent inspectors, and is placed in respect to financial matters under the commercial director, and as to technical matters under the technical director.

* From an article in the *Elektrische Kraftbetriebe und Bahnen.*

The commercial executive includes the following sections—(1) General management and secretariat, (2) Staff, (3) Legal bureau, (4) Chief accountancy, (5) Operating accounting, (6) Inspection, (7) Chief cashier's office, (8) Sick fund, (9) Publicity section, (10) Stores and materials.

In Section 1 the general management and departmental matters are dealt with, while all matters affecting employees come under the Staff section. In the Legal bureau all questions of liability, accidents, and legal proceedings, as well as agreements, are worked out.

The chief accountant's bureau (No. 4) has been organised on general commercial principles, as in the case of a great industry. The book-keeping itself is adapted to the requirements and forms of ordinary commercial routine. The records kept of the running of the system provide all the necessary data for statistics in a very thorough manner, so that complete superintendence in detail of the receipts and expenses is rendered possible. The inspection section exercises control of the outdoor staff and insures, amongst other things, that the wages lists, the fare receipts, etc., are entered accurately. The chief cashier's bureau has been established as a completely independent section, it having hitherto been included with the book-keeping. The sick fund, which is controlled by employer and workers, constitutes an independent section.

The continuously growing importance of advertisements on the tramway cars has made it necessary to set up an advertisement section, which, with the assistance of well-known artists, is called upon to design advertisements for the inside and outside of the cars.

Then throughout Berlin there will be erected special stopping place announcements, showing the services that pass them, and the charts of their routes, which will generally be lighted at night. It is expected that from suitable advertisements at these places a considerable income can be obtained. The tramway ticket advertising, as well as the advertising on the properties belonging to the tramways, will also be specially organised.

Perhaps the most important section of the commercial management which, in consequence of the combination of such a large number of lines with different equipment, had to be newly organised and put upon a commercial basis, is the management of material and supplies. This includes a chief depot which has been set up in Wittenau, and the 50 auxiliary stores distributed over the tramway stations, and other depots. The purchasing department, among the duties committed to it by the chief stores management, will look after invitations for tenders and the issue of orders. A carefully designed card filing system renders available all necessary data and contributes to a thorough superintendence of the work. The stores department works hand in hand with the technical section, so that in the purchases particular attention will be paid not only to the price, but to what is of even more importance, the quality of the various materials and equipment.

The following sections come under the technical executive—(11) The chief workshop, (12) depots with the local workshops, (13) permanent way section, (14) building maintenance section, (15) maintenance of the overhead equipment and return circuit, (16) operating section, (17) the section for transporting

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material and control, (18) technical secretariat, (19) technical supervision bureau.

The combination of the various tramway undertakings which brought about an increase of the original 21 tramway depots of the greater Berlin tramway system to 35 depots, made also a fresh distribution of the work of car maintenance and repairs necessary. The Greater Berlin tramway system was divided into eight districts, which included four to five tramway depots, with a special circuit workshop. In this workshop the annual overhaul of the cars took place and the simpler repairs were undertaken. Each district is controlled by a works engineer, whilst the management of all these districts is confided to the chief engineer of car maintenance.

In the chief workshop the important thorough overhaul and renewal work on the cars is carried out every two or three years. The chief workshop itself embraces five sub-sections; the motor cars, electric, trailers, special trackwork and tool sections, which are again sub-divided into suitable special sections. Here too special departmental book-keeping and a wages estimate system that hitherto had not existed, has been introduced, similar to that in all tramway depots and district workshops. It is therefore possible now to obtain exact knowledge of the cost of the individual operations that take place, and to take proper measures for increasing efficiency and improving the management. The newly installed manual training school will also assist in increasing the efficiency of the work and stimulating the workers' zeal.

Of particular importance in the efficient control of the working are the reports on the number of injured cars withdrawn daily from service at the various tramway depots, and the records of the material used in relation to the mileage travelled, the number of damaged motors on the various lines, etc.

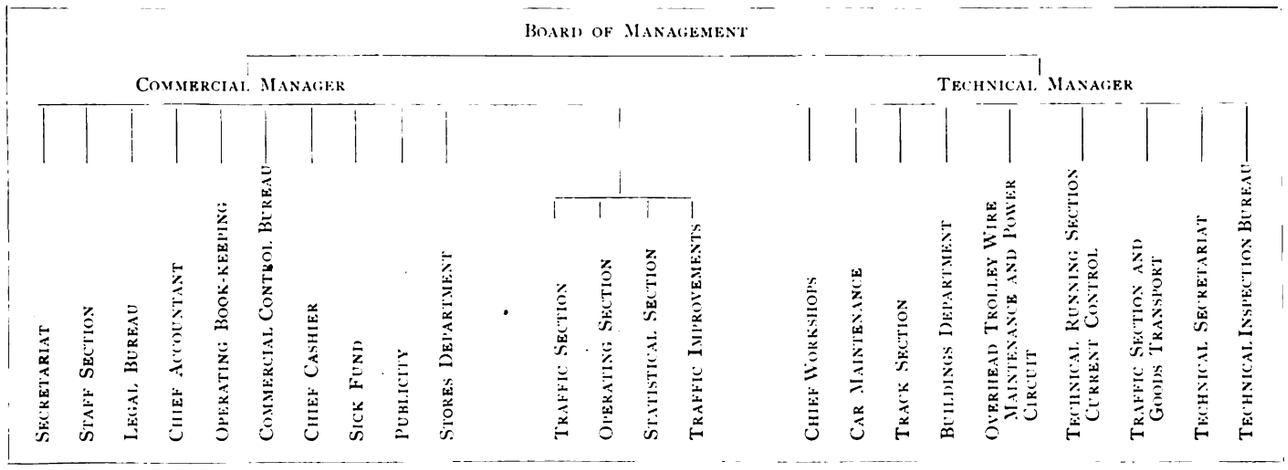
A special "life record" for each car has been instituted; in which, besides the daily distance travelled, all occurrences after it has been put into service, changes in equipment, etc., are entered.

Besides the daily overhauling of the cars, a thorough fortnightly inspection has been introduced, during which a special inspection gang undertakes an exhaustive test of the whole car installation, so that defects are discovered in time and remedied. Through this close examination, within a few months, the number of cars withdrawn from service, compared with the previous year, have been reduced by a third.

The permanent way section, like the car maintenance section, is divided into six districts, which run in sector form from the centre of the city outwards. A special road engineer is in charge of each such section, which is further divided into three sub-sections with a road foreman for each. Detailed statistics will be kept of the permanent way section in order that the work of the various districts may be compared with each other, and that full information may be obtained of the maintenance work.

The buildings section is in charge of the maintenance of the existing buildings and the carrying out of new construction.

The section for overhead maintenance is in charge of a superintendent engineer and is divided into North and South Berlin districts, each under the control of an engineer. Besides the installation and maintenance of the conductor system, the inspection of earth currents is also allocated to this section, which is carried out very comprehensively. The results already achieved have led to a substantial reduction in leakage and a saving in expense to the city which has hitherto been entailed through damage to gas and water pipes by stray currents.



Organisation of the Berlin Tramways

An important section is that dealing with the traffic staff which, besides the selection and training of the drivers, in the psycho-technical instruction and testing section, gives particular attention to reducing progressively the current consumption per car-mile. This is accomplished by the very careful superintendence and instruction of the motormen in correct driving. For this purpose there are 50 technical driving instructors, who also have to see that no car is kept in active service that runs heavily, that the rails are always cleaned punctually by the proper means, etc. The result of the work hitherto done in this section is such that the consumption of current compared with the previous year has fallen about 15 per cent. per car-mile.

Owing to the combination of all the tramways it became necessary to organise afresh the transport of the material from the chief store and chief workshop to the various districts. A special section for transport was consequently formed, to which the management of the 60 motor tower wagons has been transferred. This section has also to organise the transport of goods on the tramway lines, and a series of important goods transport services has already been set up. From the transport of parcels for the post office the year's income

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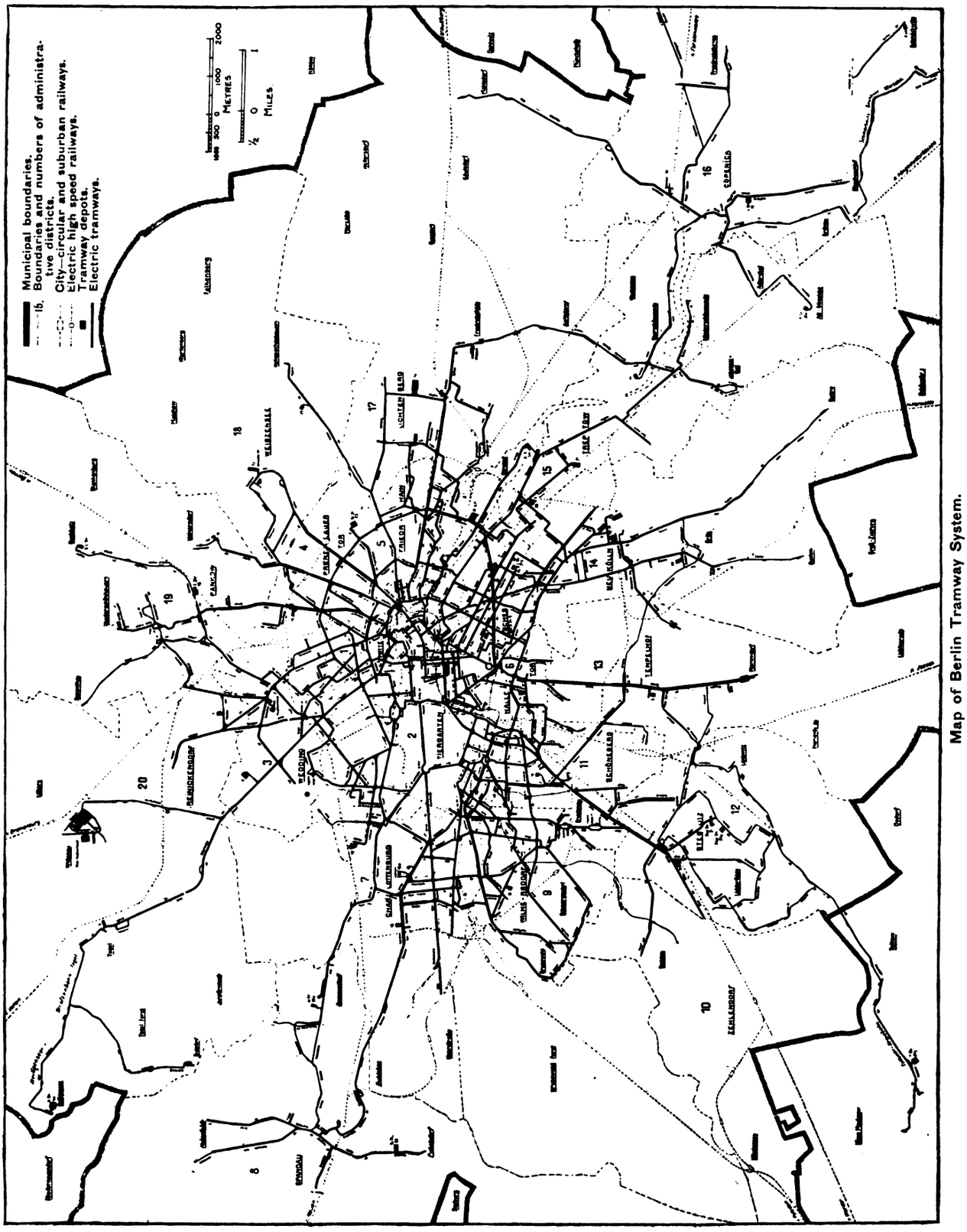

Map of Berlin Tramway System.

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is 6,000,000 marks, whilst the Imperial Post effects by this method of transport a saving for itself calculated at one and a half million marks.

Other extensive movements of goods between various factories, canals and railways are being introduced. The Imperial authorities afford the most thorough support to this conveniently arranged goods carrying service, by which much of the traffic is dealt with at night in order to equalise the consumption of energy as much as possible.

Two special sections, technical secretariat and technical revision bureau, serve to assist the technical director in managing the various branches of the service. It is intended by careful organisation and strict inspection of all work done to reduce the cost of maintenance to a minimum.

The traffic section occupies a special position within the management and is under the guidance of a traffic manager. It is divided into three sub-sections; (*a*) traffic, (*b*) working, (*c*) traffic statistics, each of which is in charge of a district inspector.

The Berlin tramway system is divided into eight inspection districts, which in their scope correspond with the engineering districts, each being under one inspector. The tramway station managers, the inspecting officials, and the conductors and motormen are immediately subject to the chief inspector.

Special importance is attached to the ever-growing sub-section (*c*) which has charge of traffic statistics. By means of careful records and thorough observation of working, the necessary data for the exact control of the traffic is obtained. On the basis of the established daily and hourly traffic variations on the various lines and sections, the corresponding running arrangements are determined, and the number of cars is always adapted to the traffic requirements of certain hours, so that greatest economy in the traffic may be secured.

The tramway traffic department, which is subject to the control of the commercial and technical departments, works in co-operation with the city traffic surveyor.

The turnover of the United Berlin Tramways amounts at present to 700,000,000 marks per annum, and the deficits in the past working year amounted to over 130,000,000 marks. It is hoped that with the increase in working efficiency to be obtained by the new organisation of the Berlin tramways, it will shortly be possible once more to bring this greatest of all tramway undertakings on the Continent to a prosperous economic condition.

RAILWAY ACTION AGAINST L.G.O.C.

At Highgate Police Court, the Great Northern Railway Company applied for and were granted summonses against the London General Omnibus Company for driving heavy omnibuses over the Great Northern Railway bridges at Muswell Hill and Crouch End Hill, contrary to the railway company's regulations. It was stated that in 1912 the magistrates at Highgate decided that the omnibus company had no right to run heavy vehicles over the bridge, and the company substituted a service of 5-ton vehicles. Recently, however, these had been replaced by a new type of omnibus weighing 6 tons.

When the case was heard on May 24 at Highgate, a driver in the employ of the Company was summoned for driving an omnibus over the Crouch End Hill bridge, and another driver was similarly summoned in respect to Muswell Hill Road bridge. The company were summoned for having caused the men to drive the omnibuses over the bridges, contrary to the Heavy Motor Car Order, 1914, as amended by the Order of 1917. The offences were admitted, and the company's solicitor stated that they were willing within ten days to reconvert the vehicles so that they did not exceed five tons.

The Bench imposed fines of 10s. each on the drivers, and 40s. on each summons against the company, with five guineas costs.

ELECTRIFICATION ABROAD.

PROGRESS IN AMERICA, SOUTH AFRICA, AND AUSTRALIA.

Reports from various parts of the world indicate considerable activity in regard to railway electrification.

Much progress is expected in Brazil this year. A Bill authorising the first step of the electrification of the Government-owned Central Railway of Brazil has been passed by Congress, and a decree to that effect has been issued by the President, states the *Wall Street Journal*, of New York. The first step includes electrification of numerous suburban lines out of Rio de Janeiro and lines running into Sao Paulo. An expenditure of an amount equivalent to about 10,000,000 dollars under normal rates of exchange has been authorised. A year ago the Brazilian Congress voted 500,000 dollars for an extensive survey. This will be the second large electrification project undertaken in Brazil. The other is the electrification of 28 miles of the Paulista Railway, begun last summer and to be completed this month.

The Illinois Central Railroad has appointed a commission to consider the electrification of its Chicago termini. The commission consists of Messrs. A. S. Baldwin, vice-president of the Illinois Central (chairman); D. J. Brumley, W. M. Vandersluis, Bion J. Arnold, George Gibbs, and Dr. Cary T. Hutchinson. The commission are expected to report in the course of three months.

SOUTH AFRICA AND AUSTRALIA.

Electrification has been decided on by the Government of South Africa of the railway from Cape Town to Simon's Town, and from Durban to Maritzburg. The Minister of Railways and Harbours states that the estimated cost of the scheme is £4,385,400. Electric traction is being introduced in South Africa for the same reason as in other parts of the world—to effect economy in working, and help to counteract the large and universal increase in operating costs.

Great financial success has so far attended the partial electrification of the Melbourne (Australia) suburban railways. It is reported that the saving effected has already amounted to £191,000 per year. The Government of the Province of Victoria has accepted the tender of the American Aluminium Company for aluminium steel conductors for the Morwell electric scheme, by which the greater part of the province is to be supplied with current. The price will be £91,416 at port of shipment. At the present rate of exchange the landed cost in Melbourne will be £30,000 less than the lowest tender for copper conductors. The whole equipment will be manufactured and shipped from Canada.

ITALY AND SPAIN.

The Italian Government has decided to electrify 5,000 miles of railway. A commission, including Italian electrical experts, will visit the United States in order to investigate the systems of railway electrification there used. A considerable length of Italian railways has already been electrified.

Nationalisation of the railways, when this is considered expedient, is the principal object of the Railway Bill recently introduced in the Legislative Chamber of Spain. Authority is sought to construct new lines, and ultimately to electrify the railways.

FUEL ALCOHOL PROJECT.

The Distillers' Company, Limited, have announced that they are prepared to import fuel alcohol at the rate of about 7,000,000 gallons per annum if the Government are willing to allow the spirit to be imported and marketed duty free. In that event the company state they would be able to produce the new fuel at a cost of 2s. 8d. per gallon. Nothing is stated as to what would be the effect of the oil companies reducing their prices to meet such competition. The import of fuel now exceeds 200,000,000 gallons per annum.

Included in the Revenue Bill were provisions which would have enabled the excise authority to make regulations facilitating the use of power alcohol, but the measure has been dropped. The Motor Legislation Committee propose to secure the incorporation of the clauses in another Bill during this session.

In a paper read before the Newcastle section of the Society of Chemical Industry, Mr. C. F. Tidman stated that the work which has been carried out at Skinningrove on the manufacture of alcohol from coke-oven gas shows the possibility of producing power alcohol without resort to fermentation. Using an 87 per cent. alcohol in which the impurities were still present, the following results were procured during a trial with a 4 H.P. Triumph—Alcohol, 58 miles per gallon; alcohol and benzol (1 to 1), 78·5 miles per gallon; and No. 1 Shell petrol, 64·6 miles per gallon.

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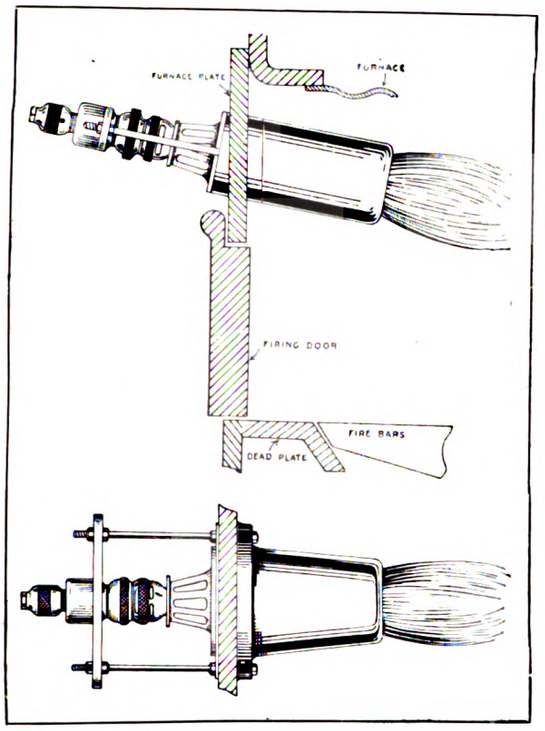
THE URQUHART SYSTEM OF OIL BURNING.

The Urquhart system of oil firing is designed as an auxiliary to provide a simple and efficient means of steam raising in conjunction with the burning of low grade solid fuel. In practice it raises the heat of the coal fire to its ignition temperature, and ignites the gases as they pass away from the furnace. A representative of THE TRAMWAY AND RAILWAY WORLD was recently given an opportunity of inspecting this system, and witnessing the ease and rapidity with which the burner and its attachments can be installed, as well as the effective manner in which the apparatus can be controlled.

Coal firing alone requires a good draught, and this is generally provided for by means of excess air, a good supply of heat and oxygen being essential. The greater the amount of excess air



Urquhart System of Oil Burners.

supplied, however, the greater will be the losses due to either of the following causes, (*a*) the furnace temperature being too low, thus preventing thorough mixing, and permitting the escape of the gases unconsumed; (*b*) temperature too low to thoroughly consume the coal, the unconsumed coal falling into the ashpan during the process of stoking. By this system easy steaming can only be obtained at a high cost. The Urquhart system of auxiliary firing provides the necessary assistance to burn coal without excess air by projecting a steady clear-burning oil flame through the furnace above the coal fire, heating the coal and unignited gases as they rise from the coal to their igniting temperature. From this it will be seen that more thorough and complete combustion is obtained, and the steaming capacity of the boiler considerably increased. Moreover, fuel cost can be reduced to a remarkable degree as the use of inferior quality of coal, coke, or other fuel is made possible. It is claimed for this system that the consumption of coal is reduced by 35 per cent. to 65 per cent., while the proportion of fuel to be used in the form of oil is only 5 per cent. of the original coal consumption.

The burner used with the Urquhart system, we are informed, is the outcome of many years' study and experience in the practice and science of burning liquid fuel. It has no restricted passages whatever, and it is therefore impossible for it to choke. In the event of foreign matter of any kind becoming lodged in the fuel chamber, this can easily be removed by means of steam admitted through the bye-pass valve, which is fitted to each burner. Micrometer reading controls are provided to enable the attendant to regulate the quantities of oil, air, and steam in the correct proportions, and to ensure maximum efficiency being obtained. The quantity of steam used for atomising purposes is only about ·125 per cent. of the total evaporation of the boiler, while compressed air may also be used as the atomising agent.

The Urquhart system can readily be applied to Lancashire, marine, water-tube, locomotive, or any other type of boiler, and the company are prepared to supply burners only with instructions for fitting the system, or to carry out the complete installation.

Although originally designed as an auxiliary system to be used with low grade coal, it can be so adjusted as to enable boilers and furnaces to be worked by either oil alone, oil and coal together, or oil and coke together. The saving when used in conjunction with coal is claimed to be from 25 per cent. to 50 per cent. in fuel costs.

The patentees and manufacturers of the oil burner and apparatus are Messrs. Urquhart's, Limited, oil fuel engineers, 20 Bennett Street, Blackfriars, S.E.

ONE-MAN CARS IN AMERICA.

A NOVEL CONVERSION SCHEME.

A notable step in the development of the one-man principle on street railway electric cars in the United States has been taken at Seattle. In this city, where one-man operation had previously been confined to "safety cars," this method of working has now been extended, on the municipal system, to large, double-truck cars hitherto worked by two men.

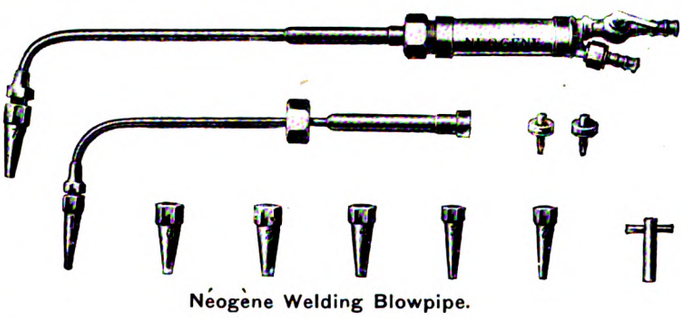
According to an article in the *Electric Railway Journal*, of New York, this plan of operating some of the larger vehicles has been adopted with only slight changes in the arrangement of the cars, costing about 100 dollars per car. These changes included permanently closing the rear entrance door and connecting the rear exit door in such a manner that the operator at the forward end has control of it. This was accomplished by running a rod the entire length of the car just under the left-hand sill and making proper connections with the door levers underneath the car step. The motorman's cab on the left-hand side of the front platform was removed, and the sand-box formerly located there was moved inside the car and placed under a seat. The bulkhead door at the front end was widened to 44 in. The controller, operator's seat, and air valves were rearranged, and air sanders, rear door operating mechanism, and a gear-wheeled type of hand brake installed at the left of the operator.

In general the *Journal* says, the plan embodied the changing of the single-end, rear entrance, and rear and front exit two-man car into a front entrance, rear exit, single-end, one-man car. The over-all length of this type of car is 49 ft. and the width 8 ft. 7 in. There is a seating capacity of 60. The motors are two Westinghouse 310-C. Twenty-seven cars of this class have been converted for one-man operation, and have been running since March 1. The trainmen are said to be well pleased with the arrangement, and no complaints from the public have been received.

NÉOGÈNE OXY-ACETYLENE WELDING BLOWPIPE.

The development of welding having spread with so much rapidity has caused inventors to turn their attention to the accessories of this form of joint. One of the greatest difficulties of the blowpipe has been the difficulty of using it in awkward places, and many castings and other parts which, had the fracture been accessible, might have been saved, have had to be scrapped.

There is now appearing on the market a new blowpipe called "The Néogène," invented and made in Belgium and marketed in this country by Walker, Crosweller and Company, of 265 Strand, W.C.2. This has for its main improvement an annealed copper neck which can be bent in any direction to reach fractures in difficult



Néogène Welding Blowpipe.

places. It is also lighter than the standard British types, is simple in design, easily cleaned, and the aspirators are removed very readily. Having three aspirators and seven nozzles, one set will serve for all thicknesses up to 1½ in. in mild steel plate.

This blowpipe has been in use in Belgium for a number of years by all the most important Belgian engineers.

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ANGLO-ARGENTINE TRAMWAYS COMPANY.

The report for the year 1920 shows that the gross receipts amounted to £4,413,165, and the expenditure to £3,198,028, leaving a balance of £1,215,136. Adding interest on investments and deposits (£44,089) and transfer fees (£424) there is a gross balance of £1,259,650. After payment of annuity to the City of Buenos Ayres Tramways Company (£70,660), interest and sinking funds on debenture stocks (£587,820), and sinking fund for redemption of preference and ordinary shares (£7,295) making a total of £665,775, there is a net balance of £593,874. Including the amount of £175,509 brought forward, the sum available is £769,385. During the year the following distributions were paid, making up all arrears and current dividends on the 5½ per cent. first preference shares; dividend to June 30, 1918, £176,000; dividend to June 30, 1919, £176,000; and for 18 months to December 31, 1920, £264,000, making a total of £616,000. Payment is now to be made of a dividend of 5½ per cent. on the second preference shares in satisfaction of arrears to December 31, 1916, amounting to £137,500, leaving £15,884 to be carried forward. The sum of £133,172 has been allocated out of revenue to the general renewals fund, against £97,000 in 1919. The number of miles open was 395½, the mileage run during the year being 61,303,692, and the number of passengers carried aggregated 432,636,355. Revised fares came into operation on April 10, 1920, and the traffic receipts show an increase of £886,981, equal to 28·36 per cent. The ratio of working expenses was 75·60, a decrease of 4·31 as compared with the previous year. The general manager, Mr. J. Pedriali, in his report says that the year 1920 commenced full of promise and terminated in a disappointing manner. The post-war prosperity, which was world-wide, had the effect of producing extraordinary activity during the first half of the year, but the slump in prices and consequent business stagnation which marked the reaction in Europe and the United States, quickly produced an effect in the Argentine, and towards the close of the year the crisis became acute. The maintenance of the rolling stock of the surface lines was carried out in accordance with the general scheme approved by the Board with the object of prolonging considerably the life of certain of the cars. At the end of the year the rolling stock amounted to 2,689, cars, an increase of 42. Motor cars numbered 1,641 and trailers. During the year the subway rolling stock was increased by the arrival from Europe of 31 motor cars, bringing the number up to 120. The number of passengers carried by the tramway cars during the year was 391,312,991, or 4·19 passengers per car kilometre. The passengers carried by the subway aggregated 41,323,364, an increase of 15·86 per cent. The increased tariff of 12 cents came into force on April 10, as mentioned above. Detailed arrangements were made to prepare the public for the change, and the question of a shortage of copper coins was to a large extent solved by the issue of coupons, of which passengers might purchase 5, 10, 15 or 20 at a time, without the necessity of receiving coppers as change. Consequently the new method of collection of fares worked smoothly from the commencement. The obligations with regard to increased wages and an eight-hour day were all brought into force before the date fixed by the ordinance, and the 8 per cent. contribution toward the pension fund has been deposited as from that date. The manager considers the settlement of the pension fund question, which has long been pending, to be a capital point in tranquilising the great majority of the employees, who now have a comparatively easy future to anticipate. There has, in fact, been a considerable improvement in the labour position during 1920. The good work of the Mutual Aid Society, which was referred to in an article in our issue of January 13, 1921, has continued, and during the past year 59,026 persons were attended, there being 15,398 consultations at the patients' own homes and 112,791 at the consulting rooms. The popularity of the society continues to increase as the men more and more appreciate the advantages which they derive from it. The erection of the society's own building will soon be undertaken. As regards the prospects for the current year, the manager does not estimate an increase in receipts beyond 5 per cent., but the great drop in the cost of fuel will favourably affect the working expenses.

The following comparative statement shows the growth of the undertaking from 1910—

Year.	Receipts.	Expenditure.	No. of Passengers carried.	No. of Miles run.	Receipts per Mile run.	Expenses per Mile run.	No. of Cars in stock.
	£	£			d	d	
1910	2,419,186	1,564,093	276,426,524	42,881,395	13·54	8·14	2,156
1911	2,631,836	1,723,928	299,154,835	46,019,328	13·73	8·36	2,207
1912	2,778,302	1,824,021	316,260,097	47,765,667	13·96	8·49	2,567
1913	2,963,191	1,969,161	342,140,422	50,872,935	13·98	8·58	2,555
1914	2,850,995	1,880,996	332,015,254	50,701,287	13·50	8·19	2,595
1915	2,709,615	1,786,740	316,982,449	50,652,892	12·82	7·89	2,721
1916	2,714,225	1,956,668	318,419,809	51,489,768	12·65	8·67	2,731
1917	2,783,412	2,051,746	324,231,620	52,456,535	12·73	8·97	2,737
1918	3,012,821	2,375,564	349,286,338	53,118,576	13·61	10·31	2,706
1919	3,296,957	2,573,742	370,734,985	53,646,027	14·75	10·89	2,644
1920	4,413,164	3,198,028	432,636,355	61,303,692	17·28	11·71	2,712

L.C.C. AND LEYTON TRAMWAYS.

AGREEMENT FOR WORKING.

The London County Council has entered into an agreement with the Leyton Urban District Council for the working of the Leyton tramways as part of the London County Council system upon the following conditions—

1 (*a*).—The London County Council will work, use, manage, and maintain the tramways undertaking of the Leyton Urban District Council as from and including a date to be arranged, without any capital payment by the London County Council, such arrangement to be for a period to June 30, 1931, determinable at that date by either party on three months' previous notice, or on any subsequent June 30 on twelve months' notice from either party.

(*b*) After deducting operating costs from the gross revenue derived from the whole of the tramways worked by the Council, the surplus to be shared, or the deficiency borne, at the close of each year's working, by the London County Council and the Leyton Urban District Council, in proportion to their capital outlay (excluding capital outlay on the generating station in the case of Leyton, and including capital outlay on the generating station in the case of London) at the end of the financial year.

(*c*) For the purpose of this agreement, capital outlay (excluding capital re-borrowed) up to March 31, 1921, to be taken as the basis for the division of the gross surplus or deficiency, but in the event of either London or Leyton incurring new capital expenditure after that date, such additional capital to be added to and dealt with in the same way as the original capital.

2. *Operating Costs.*—The operating costs to be the operating costs for the whole of the tramways worked by the London County Council, provided that the power for operating the Leyton tramways will be supplied as set out in paragraph 3.

3. *Power Supply.*—Such power as may be required for operating the tramways in Leyton shall be supplied to the London County Council by the Leyton Council at a total cost per car-mile not exceeding the London County Council cost of power per car-mile over its whole system, including debt charges.

4. *Maintenance.*—The London County Council will maintain the permanent way, overhead line, tramcars, car sheds, and offices in a reasonable condition.

5. *Renewals.*—For the purpose of this agreement it is assumed that the Leyton Council has included the cost of renewals in its charges for maintenance, and that the London County Council will add the cost of renewals to the maintenance charges on the London County Council system.

6. *Stores.*—The Leyton Council will hand over to the London County Council without charge such rails and special work, loose tools, stores, and materials as may be agreed, which have been purchased for the maintenance and renewal of their undertaking. An inventory to be made out of loose tools, stores, and materials handed over by the Leyton Council, and the equivalent of these to be handed back to the Leyton Council on the termination of the agreement.

7. *Fares.*—The London County Council may make (*a*) such adjustments or alterations as it considers desirable in connection with the fares in Leyton; and (*b*) if necessary make any application to the Ministry of Tansport for an increase of fares.

8. *Existing Through Running Adjustment.*—The London County Council will pay the Leyton Council on the basis of an agreed operating cost per mile for all car-miles due to Leyton at the time of the transfer, or, in the event of Leyton owing mileage to the London County Council, then the Leyton Council will make payment to the London County Council on such basis.

9. *Staff.*—The London County Council will take over the tramways manager and his office staff (with the exception of those officers who are over 60 years of age), also the traffic superintendent and car shed superintendent, on their present conditions of service, pending re-arrangement of the staff.

The London County Council will take over such of the operating staff of the Leyton tramways on the London County Council conditions as shall, seven days before the date of the transfer of the Leyton undertaking, have elected to be so taken over. The others of the operating staff will remain as staff of the Leyton District Council.

10. *General.*—Details to be agreed with regard to the taking over of any outstanding advertisement contracts, outstanding orders and contracts, including through-running agreements, telephones, fire, accident, and other insurances, licences, etc.

11.—A joint committee, consisting of four representatives of the London County Council and four representatives of the Leyton District Council, shall be set up to act in a consultative capacity as regards the services and development of the tramways undertaking in Leyton; such joint committee to meet quarterly, and at other times on requisition by either party.

(*d*) That the Highways Committee be authorised to settle the exact terms of the agreement referred to in the foregoing resolution (*c*).

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BRITISH THOMSON-HOUSTON COMPANY.

RECORD BUSINESS IN TWENTY-FIFTH YEAR.

Mr. H. C. Levis, presiding at the annual meeting of the British Thomson-Houston Company on May 18, alluded to the fact that the company had completed the first quarter of a century of its existence. It was a pleasure to submit on such an occasion a report which he thought the shareholders would consider satisfactory. For many years the growth of the company was very slow, because of the depressed state of the electrical business in this country and the competition which existed. About 1912 matters commenced to improve, and this improvement had been steadily maintained up to nearly the end of the year under review, when a reaction began. As a whole, however, the year was a record one, and the volume of orders on hand at January 1, 1921, was larger even than on the same date a year before, particularly in heavy plant. The depression which began again toward the end of last year had continued so far during the present year, but he could not help feeling that a revival would take place as soon as the present strikes were settled, as they were receiving a number of important inquiries. During the year they had expended on their factories the large sum of £595,000. The total floor space of the various factories now amounted to about 1,650,000 sq. ft. The number of employees at December 31 was over 9,000. The profits for the year, after deducting all expenses and charges other than interest on debentures and loans, and after making provision for the estimated war taxation for 1920, was £470,470, an increase of nearly £60,000 over 1919. This was realised because of the fact that the amount of unfiled orders on the books at January 1, 1920, was up to that time the largest in the history of the company, and the volume of orders received during the year formed a new record.

After further explanations of the report (a summary of which is appended), Mr. Levis proceeded—

EMPLOYEES' PROFIT-SHARING SCHEME.

"Many of our employees having from time to time expressed a desire to become financially interested in the company, the directors have arranged to offer to them savings certificates in multiples of £10, bearing interest at the rate of 7 per cent. per annum, free of income-tax up to 6s. in the £, and with a right of participation in the earnings of the company under certain conditions. They are to be paid for on an instalment plan, which will spread the payments over a period of nearly two years. At any time an employee can apply for repayment, and, on the other hand, the company can pay off the certificates. They are personal to the employee, and not negotiable or assignable.

"Later on, the company may decide to offer some of its shares to its employees on a deferred payment basis, but for the present it is felt that these certificates, with a fixed and attractive rate of interest, and with participating privileges, will answer the purpose, and prove to be a sound and attractive savings investment.

"All the welfare arrangements that I alluded to last year as having been made for the benefit of our staff are being continued with success. The memorial which the company has decided to erect at Rugby to those of its employees who fell in the Great War will be completed during the current year. It will be a modest, though dignified, cross of Portland stone, on an appropriate base of the same material, the whole being designed by Sir Edwin Lutyens, the designer of the Cenotaph in Westminster. On the base will be inscribed the names of the employees of the company who died for their country."

On the motion of the chairman, seconded by Mr. A. R. Monks, Messrs. E. A. Carolan, F. Fraser, and H. N. Sporborg, the retiring directors, also Mr. J. M. Woodward, who has been appointed a member of the Board since the last annual general meeting, were re-elected directors of the company.

THE REPORT.

The report of the directors for the year ended December 31, 1920, which was unanimously adopted, states that the greater part of the extensions of the Rugby works begun during 1919 were still uncompleted owing to the various causes which have retarded building operations generally throughout the country. The new buildings which have come into occupation at the Willesden works have materially increased the manufacturing facilities there. Changes found necessary at the Birmingham works are being carried into effect as rapidly as possible. The profits for the year, after deducting all expenses and charges except interest on debentures and loans, and after making provision for estimated taxation for the year, amounted to £470,470, while £208,430 was brought forward from last year. Deducting interest on debentures and loans, amounting to £179,990, there was a balance of £498,910. Of this sum the directors recommended that £210,000 be appropriated for depreciation, reserve, etc., and £63,019 for dividends, leaving £225,891 to be carried forward. The dividends proposed were as follows—Old preference shares (since converted into ordinary shares), for eight months at 4 per cent.; new preference shares for one month at 7 per cent. (free of income-tax); ordinary shares at 6 per cent., free of income-tax. The directors record their high appreciation of the way in which all departments of the company have discharged their duties during the year. The pressure of work has been very heavy, notwithstanding the fact that toward the end of the year the volume of orders began to show some sign of reduction.

LEEDS CITY TRAMWAYS.

YEAR'S FINANCIAL STATEMENT.

The following is a summarised statement of income and expenditure for the year ended March 31, 1921, compared with the figures for the preceding year.

	Year ended March 31, 1921.	Year ended March 31, 1920.	Average per car mile. 1921.	Average per car mile. 1920.
	£	£	d.	d.
Traffic revenue	989,685	869,289	23·340	21·110
Sundry revenue	5,950	7,237	·140	·176
Total revenue	995,636	876,526	23·480	21·286
Working expenses	729,385	606,347	17·201	14·725
Gross profit	266,250	270,179	6·279	6·561
Add Interest on Investments	9,413	8,914	·222	·217
Bank Interest	2,422	4,552	·057	·111
	278,086	283,646	6·558	6·881
Against which is charged—				
Loan charges	108,871	107,892	2·568	2·629
Do., Sovereign St. estate ...	5,800	5,800	·137	·141
Do., Burmantofts property	135	135	·003	·003
Contributions to costs of Act, 1914	—	445	—	·011
Revenue contribution to capital outlay	2,059	800	·049	·019
Rental of Morley Light Railways	2,596	2,642	·061	·064
Income tax	52,832	44,430	1·246	• 1·079
Allowances (war service) ...	—	1,393	—	·034
Permanent way renewals ...	100,211	36,349	2·363	·883
	272,506	199,888	6·427	4·855
Surplus	£5,580	£83,757	·131	2·034

The total receipts, miles run, etc., are appended—

	Year ended March 31, 1921.	Year ended March 31, 1920.	Increase.	% of Increase
Total receipts ...	£995,636	876,526	119,109	13·59
Miles run	10,176,874	9,882,737	294,137	2·98
Passengers carried ...	138,621,331	136,567,011	2,054,320	1·50
Receipts per mile ...	23·480d.	21·286d.	2·194d.	10·31
Average fare paid per passenger	1·696d.	1·515d.	·181d.	11·95
Population served ...	580,000	580,000	—	—
Number of times population carried	239	235	4	1·70
Amount paid per head of population ...	33s. 9d.	29s. 9d.	4s.	13·44

Carthagena and Herrerias Steam Tramways.—The profit for 1920 was £5,995, plus income tax and transfer fees £506, making £6,501, less interest on 5 per cent. registered debentures £4,435, exchange account £2,443, leaving a net loss of £376, plus debit balance brought forward of £5,302, making a debit of £5,678. Heavy renewals had been carried out to three locomotives, and the cost of £5,579, has been charged to improvement and renewal account. Traffic receipts for the first four months of 1921 amount to £11,271, a decrease of £6,460.

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GLASGOW CORPORATION TRAMWAYS YEAR.

The financial year for all Glasgow Corporation departments closed on May 31. The following are the traffic, etc., statistics for the tramways department for the year—

Average track mileage open during year (single) 196½

	Total.	Increase.
Car mileage	26,902,874	443,859
Traffic revenue	£2,388,444 6s. 5d.	£671,953 9s. 9d.
Traffic revenue per car-mile	21·307d.	5·737d.
Traffic revenue per passenger	1·281d.	·472d.
		Decrease.
Passengers carried	447,601,811	61,738,075
Passengers carried per car-mile	16·638	2·612

The following statement gives the number of passengers carried at each fare—

Fares.	Year to May 31, 1921.	Per-centage.	Fares.	Year to May 31, 1920.	Per-centage.
½d. ...	92,227,336	20·60	½d.	304,865,756	59·86
1d. ...	171,519,560	38·32			
1½d. ...	118,437,023	26·46	1d.	142,076,326	27·89
2d. ...	41,217,253	9·21	1½d.	37,989,011	7·46
2½d. ...	11,899,790	2·66	2d.	12,394,898	2·43
3d. ...	6,003,675	1·34	2½d.	5,596,692	1·10
3½d. ...	2,789,744	·63	3d.	2,732,362	·54
4d. ...	2,553,432	·57	3½d.	2,650,163	·52
4½d. ...	405,342	·09	4d.	1,034,678	·20
5d. and upwards	548,656	·12			
	447,601,811	100·00		509,339,886	100·00

The weight of copper received during the year was 777 tons, and the weight of silver was 190½ tons.

Since July 1, 1894, to May 31, 1921, the total passengers carried at each fare, with percentages, are as follows—

Fare.	Passengers.	Percentage.
½d.(*)	2,979,537,218	44·75
¾d.	92,227,336	1·38
1d.	2,744,228,334	41·22
1½d.	541,723,125	8·14
2d.	176,343,750	2·65
2½d.	59,216,688	·89
3d. and upwards	64,472,430	·97
	6,657,748,881	100·00

(*) Includes old two-stage tickets.

The miles run aggregated 491,996,964, and the traffic revenue £24,342,524 15s. 8d.

BRUSH ELECTRICAL ENGINEERING CO.

CHAIRMAN'S HOPEFUL OUTLOOK.

The annual meeting was held in London on May 9, Mr. E. Garcke presiding. The chairman said the accounts again reflected the prosperous condition of the company. Adding to the balance of profit of £191,096 the amount of £74,726 brought forward, there was available £265,822. The directors recommended, among other appropriations, the addition of £53,377 to general reserve, bringing it up to £75,000, and the payment of a dividend of 15 per cent., leaving £143,268 to be carried forward, subject to excess profits duty for 1920 and previous years. The gross profit on trading amounted to £285,328, compared with £223,000 in the preceding year, but the expenses, of course, were also higher. Increased capital had been provided in order to deal with the largely increased volume of business, which had necessitated extensions of buildings and plant and a larger lock-up in stock of materials and work in progress

He thought they might regard the present position with satisfaction and look forward to the future with confidence. The specialities they controlled placed them in a favourable position, notwithstanding the prevailing depression in most branches of industry. Their order books were well filled, and there had been a gratifying increase in the demand for their Brush-Ljungstrom turbo-generator plant for electric power production. The installation of plant of this type effected such marked economy in coal, and consequently in the cost of electric power, that its introduction had; in the cases of some electricity supply undertakings, been directly instrumental in converting a yearly loss into a substantial profit.

GROWTH OF BUSINESS.

They began manufacturing the Ljungstrom turbine in 1914. The orders in hand to-day represented in horse-power more than the total they supplied in the whole of the period from the commencement of manufacture to the end of 1920. This gave some idea of the growth of the business. Whatever might be the result of the coal controversy, it seemed clear that economy in coal consumption was at once a duty and a necessity. From this viewpoint they had every reason to believe that their turbine, which effected such a marked saving in fuel, and which time had proved to be in every way reliable in service, must command a good market. The directors hoped that the large new factory now under construction at Falcon Works, Loughborough, to be devoted to the manufacture of this plant, would enable them to cope better with the demand.

Mr. Garcke added that he had referred at the meeting last year to the company's difficulties in carrying through large contracts—which necessarily took months to execute—due to the fluctuating markets for materials and the uncertainty of labour costs, which compelled them to stipulate for price adjustment clauses. In this respect the position had improved, as they were now able to take the risk of making contracts at firm prices, which was a more satisfactory basis both for their customers and for themselves.

The report was unanimously adopted.

FINANCIAL REPORTS AND MEETINGS.

CITY OF BUENOS AYRES TRAMWAYS COMPANY.—A dividend has been declared of 1s. 3d. per share, less tax, for the quarter ended March 31.

SOUTHEND-ON-SEA CORPORATION TRAMWAYS show a loss on last year's working of £8,000. The estimated deficit for the coming year is £14,000.

CHLORIDE ELECTRICAL STORAGE COMPANY, LIMITED.—A dividend of 5 per cent., free of tax, on the ordinary shares has been declared, making 10 per cent. for the year.

SALFORD TRAMWAYS AND RATE RELIEF.—Out of £17,000 profit for the year ended March 31 last, Salford Corporation Tramways Committee recommend that £10,000 be placed to renewals account and that £7,000 be allocated for the relief of rates.

BRISBANE ELECTRIC TRAMWAYS INVESTMENT COMPANY has declared a dividend of four shillings per share, free of tax, on ordinary shares for the half year, making 8 per cent. for the year. To the reserve is placed £20,000, while £8,000 is allocated to depreciation of investments fund. A sum of £42,837 is carried forward.

ELECTRIC TRACTION DEVELOPMENTS, LIMITED.—This company was registered as a private company on May 4, with a capital of £4,000 in £1 shares, to acquire any interests, patents and concessions in relation to railways, tramways and any method of traction. The directors are P. Horsfall and T. H. Minshall. The registered office is 34, Victoria Street, Westminster, S.W.

JARROW AND DISTRICT ELECTRIC TRACTION COMPANY, LIMITED.—The report for 1920 shows a total revenue of £16,532, an increase of £505. After deducting all expenses, including interest on debentures, and £800 for renewals, there remains £2,595, plus £4,620 brought forward. The directors propose a dividend on ordinary shares at 5 per cent. for the year, carrying forward £4,219.

PERNAMBUCO TRAMWAYS AND POWER COMPANY.—The State of Pernambuco has granted to the Pernambuco Tramways and Power Company the right to increase tramway fares subject to the completion of the electrification of the 10 km. of steam tramways and an extension of 6 km. of single track suburban electrical lines. To repay temporary loans, to build the tramways and extend the lighting and power programme, the shareholders have authorised the creation of a prior lien mortgage of £650,000. Later a prior lien debenture issue will be made sufficient to provide £450,000.

HULL CORPORATION TRAMWAYS.—A statement dealing with the past year's working of Hull Corporation Tramways was given at the meeting of the Tramways Committee on May 23 by the chairman (Mr. A. D. Willoughby). The revenue, he said, was £387,610, and the expenditure on revenue account £376,753, leaving a surplus of £10,857. Compared with the previous year there had been an increase in revenue of £78,706, and increased expenditure of £57,572. Last year there was a deficit of £9,647. The reserve fund to meet the cost of renewals amounted to £137,900. The undertaking was paying its way with a very small margin.

TYNEMOUTH AND DISTRICT ELECTRIC TRACTION COMPANY, LIMITED.—The report for the year ended December 31, 1920, shows that the revenue amounted to £38,563 and the expenditure to £31,514, leaving a balance on the year's working of £7,049. Including the sum of £7,910 brought forward there is an available balance of £14,960. The directors recommend the following allocations—Dividend on the cumulative preference shares of 5 per cent., £1,525; dividend on the ordinary shares at 10 per cent., £4,641, leaving £8,794 to be carried forward.

POTTERIES ELECTRIC TRACTION COMPANY.—The report for 1920 shows capital expenditure was £22,081; revenue amounted to £299,929. Traffic and parcels receipts, £280,632, exceed those of last

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year by £28,193; expenses increased by £44,261. After deducting expenses, including £11,025 for debenture interest and provision of £15,000 for renewals, there remains £28,500 (as compared with £44,140), plus £12,081 brought forward. The directors recommend placing to reserve £10,000, dividend on ordinary shares at 5 per cent. per annum, carrying forward £6,082. The reserve will then stand at £110,687 and renewals at £71,319.

ROTHESAY TRAMWAYS COMPANY, LIMITED.—The report for the year ended December 31, 1920, shows that the total receipts amounted to £21,345. After providing for all expenses chargeable to revenue, including £1,256 for debenture and other interest, payments to local authorities amounting to £270, providing £1,375 for the renewals fund, and writing off £1,000 from discount and commissions in respect of issue of debentures, there is, with £1,692 brought forward from the previous year, a balance of £5,562. The directors recommend that £1,000 should be placed to reserve, and £1,609 carried forward. Dividends recommended are 5 per cent. on the preference shares, and 3 per cent. on the ordinary shares.

GATESHEAD AND DISTRICT TRAMWAYS COMPANY.—The annual meeting was held in London on May 12. Mr. H. S. Day (the chairman) presided, and said he thought the results of the year's working were satisfactory. Alluding to the possible purchase of the concern in 1922 by the Corporation, Mr. Day said the company had in their minds the desirability of spending further capital on a portion of the undertaking, but, if the Corporation decided to purchase, it would be undesirable for the company to do so. If, however, the Corporation would give a distinct intimation that they were not going to purchase, it would be very desirable that these improvements should be carried out. The report showed the profits for the past year were £31,865, and £3,658 was brought forward. A dividend of 10 per cent. was proposed, placing £13,000 to reserve, and carrying forward £2,018.

SWANSEA IMPROVEMENTS AND TRAMWAYS COMPANY.—The annual report shows that the revenue for the year ended December 31 1920, amounted to £119,495, as compared with £112,593 for 1919, an increase of £6,901. The working expenses were £108,097, as compared with a net expenditure of £89,739 for 1919, an increase of £18,357. The balance on working was £11,398, as compared with £22,853 for the previous year. After charging debenture interest £1,181, and the amount payable to Swansea Corporation in respect of the tramways and light railways leased from them of £7,967, there remains a surplus of £2,249. That sum, together with £2,447 brought forward, makes a balance of £4,697 available, to be allocated as follows—To dividend on 6 per cent. preference, £590; on 5 per cent. preference, £2,008, and carried forward to next account, £2,099. The sum of £21,701 was expended on renewals of permanent way, electrical equipment, cars and plant. The Mumbles Railway and Pier shows a profit for the year of £2,465.

DUNDEE TRAMWAYS DEFICIT.—According to an approximate statement of the accounts of Dundee Corporation Tramways for the year ended May 15 last, presented at a meeting of the committee on May 23, a deficit of £5,316 is probable. The income was estimated at £168,664, and the expenditure at £173,980. The Convener, Mr. Adam Malcolm, asked that the deficit should be carried forward to next year, and said that it could have been wiped off by reducing the sum of £12,800 placed to the renewals fund. When the work of relaying the rails on the Lochee route had been carried through, however, the renewal fund would almost be wiped out, and it was better for the department that the fund should be built up. The capital cost was a big millstone round the neck of the department, and he would like to get it cut down. The sub-committee agreed to recommend that the deficit should be carried forward. The estimates for the forthcoming year show a credit balance of £372. The general manager, Mr. W. T. Young, in the course of a report, mentions that the action of the Broughty Ferry Company in increasing their fares is likely to result in a loss of £2,800 to the department's revenue.

BOURNEMOUTH CORPORATION TRAMWAYS.—In his annual report for the year ended March 31 last, Mr. I. Bulfin, the general manager, states that the receipts from the tramways were £6,805 more than the previous year, but the working expenses showed an increase of 19·64d. per car-mile, or £37,773. There was a net deficit for the year of £14,868, to which must be added a loss of £148 on the running of motor omnibuses, making a total debit balance of £15,016. The total number of passengers carried was 27,403,523, as against 27,080,255, an increase of 323,268. The total car-miles were 1,857,576, an increase of 172,702. The total receipts amounted to £196,833, as against £190,028, an increase of £6,805. The receipts from parcels were £756 as against £678 last year. The revenue from advertising amounted to £1,112 as against £979. The traffic receipts per car-mile were 25·26d., as against 26·88d. The working expenses amounted to £152,044, an increase of £37,773, and this reduced to cost per car-mile is 19·64d., as against 16·27d. last year. The gross expenditure for the year was £212,894. The manager points out that if the debit balance is met from the reserve funds, a balance in hand will be left of £2,991. Mr. Bulfin says that permanent way renewals have cost £1,040 and the reconstruction is well in hand. About seven miles of single line have been relaid.

OLDHAM, ASHTON AND HYDE ELECTRIC TRAMWAY, LIMITED.—The annual report shows that the net profit for 1920 was £11,500 and £5,987 was brought forward, making £17,487. A sum of £6,000 is placed to reserve (making £69,548). A further dividend on the ordinary shares, making 6 per cent. for the year, is proposed, and £5,987 is to be carried forward. The £29,400 first mortgage debentures outstanding at December 31 last have since been paid off. At the annual meeting on May 23, Mr. Emile Garcke, chairman, after giving an account of the year's work, referred to the sale of the undertaking, which was held by the company under the Tramways Act of 1870. Under Section 43 of that Act the local authorities have the right, upon the expiration of 21 years, to purchase the undertaking upon giving six months' notice. Failing an agreement the purchase price has to be settled by arbitration. The authorities gave the requisite notice, but owing to circumstances arising out of the war, the arbitration was considerably delayed. The award was issued on September 13, 1920. Several items were referred to the High Court for decision on legal points, and eventually the sum of £132,641 was fixed, but the local authorities advanced certain claims and eventually offered to pay £125,000 in settlement. If the company would not accept that offer, the authorities offered to pay a larger sum without prejudice to their claims for depreciation. The directors have given the matter serious consideration and advised the shareholders to accept the offer. It appeared that at the moment there would be something like 24s. per share available as a return on capital, and on the whole the chairman thought the shareholders might be congratulated upon the position. The ordinary shareholders had had a regular return of about 6 per cent. per annum since the formation of the company, and both they and the preference shareholders had the prospect of receiving the return of the whole of their capital with an appreciable premium, which was a better result than was anticipated a few years ago. This was due to the fact that the undertaking had been sold at a time when the prices were high. The meeting unanimously decided to accept the purchasing authorities' offer.

BRISTOL TRAMWAYS AND CARRIAGE COMPANY, LIMITED.—The report for the year ended December 31 shows that the revenue for the year amounted to £920,744, an increase of £72,695, compared with the previous year. The working and general expenses and renewals amounted, however, to £958,884 In view of the abnormal conditions of the year, the directors have transferred £45,000 from the reserve fund, so that with the excess profits duty repayable, and the balance from the last account, there is a balance on net revenue account of £90,225. Debenture interest, bankers' and loan interest required £37,497; dividend on the 4 per cent. preference shares for the year, £14,000; interim dividend on the ordinary shares at 3 per cent., free of income tax, £15,000. The balance of £23,727 is appropriated as follows—Final dividend on the ordinary shares at 4 per cent., free of income tax, making 7 per cent. for the year, £20,000, leaving £3,727 to be carried forward. The receipts of the tramways department showed an increase of £160,079, and the carriage department a decrease of £89,246. The number of passengers in the company's cars and motor omnibuses was 84,983,434, an increase of 12,145,358. Under an interim order of the Ministry of Transport, an increase of the statutory fares on the company's tramways was put into force on July 15, and under a subsequent order an additional increase was introduced on February 1, 1921. At the annual meeting, on May 11, Mr. Samuel White (chairman) presided, and in moving the adoption of the report and accounts, said in all the company's history they had never had occasion to present a similar report, but, as he had foreshadowed, it was due to the prevailing exceptional conditions. Their position, unfavourable as it might appear, was of their own choice, and was the effect of the deliberate policy they had laid down. Broadly stated, it was this—That because of the exceptional position they occupied in being producers of war materials during practically the whole of the war, under conditions which brought to the company very substantial profit, it was the proper policy for them that they should utilise those profits as far as might be necessary in relief of the community in connection with the other branch of their work, the operation of the tramway and other public services. They were able to take credit for being the last tramway undertaking in the kingdom to adopt the measure of increasing fares upon their tramway system. They were doing what they could to bring revenue into proper relation with expenditure, but they saw that as a result of the whole year's account and operations they had spent nearly a million of money, taken nearly the same sum, but finished up with a balance on the wrong side. Quoting figures to justify this position, Mr. White pointed out that the total of the three chief heads of expenditure last year and the year prior to the war, 1913, although the changes in the volume of work done were not very great, had increased from £330,000 to £998,000.

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TRAMWAY AND LIGHT RAILWAY NOTES.

BOURNEMOUTH.

NEW CARS—FARES INQUIRY.

Two of the 20 new cars ordered by the Corporation Tramways department have been delivered and others are expected at intervals. They are largely the same as those purchased just prior to the war, and on the whole have a substantial and serviceable appearance. The upper deck is more spacious and has slightly larger seating capacity. The platforms and stairways are more roomy, and the ends of the car are enclosed with glass. The new vehicles cost about £3,000 each. An inquiry was opened at the Ministry of Transport on May 24 into the application of the Bournemouth Corporation for permission to increase tramway fares until February, 1923. The maximum charges for which authority was sought were—ordinary passengers, 1½d. per mile or portion thereof; workmen, 1d. per mile or portion thereof. The Corporation was represented by Mr. H. Ashling, town clerk, and Poole Corporation (who opposed the application) was represented by the Hon. Evan Charteris, K.C. Mr. Ashling explained that the Corporation had already an interim order which was granted as a matter of urgency by the Ministry, and the application now submitted was in the same terms. After explaining the history of the agreement between the Poole Council and Bournemouth Corporation, Mr. Ashling said with regard to the whole undertaking—the Poole lines and the Bournemouth lines—from 1905 the first three years showed a small surplus. The next four years showed a deficit, which had to be met out of the Bournemouth rates. From 1912 until last year there was a surplus, but last year there was a deficit of £15,000, and this year the estimated deficit was £25,000. Mr. I. Bulfin, the tramways manager, gave evidence in support of the Town Clerk's statement. Mr. Charteris urged that a burden of over £10,000 had been thrown on the Poole rates, though the agreement under which they were working was not equitable, and could not bring any advantage to Poole. On the suggestion of the chairman, it was agreed that the parties should confer, and the inquiry was adjourned.

DERBY.

TRACK RECONSTRUCTION.

Mr. C. A. Clews, the borough surveyor, has reported that the main street (St. Peter's Street), which was paved with wood and upon which there is a 1½-minute service of cars, was relaid last autumn owing to the wear on the rails. The wood paving had worn down very evenly indeed, and the blocks taken up had been used elsewhere. The joints of the new rails were welded by the Thermit process, every fifth joint being made with fish-plates. The joints generally on the rest of the system had, during the last twelve months, been electrically welded up where hammered, the rail corrugations removed by scrubbing and filing, and about 18,000 yards of rail had been hardened *in situ* on the running surface. By this means it is hoped that the life of the rails will be considerably extended.

EDINBURGH.

FARES—CONVERSION OF CABLE CARS.

At a meeting of the tramway sub-committee of the Town Council, suggestions were made that certain fares should be reduced, but the manager (Mr. R. S. Pilcher) pointed out that such a course would involve a heavy loss. It was decided that no action be taken, on the understanding that the question be considered when the Pilrig-Liberton route is electrified. At the meeting of the Town Council, Mr. W. R. Sleigh moved approval of a recommendation by the tramway committee (of which he is chairman) that the conversion of the cable car bodies for use on the Pilrig-Liberton and Broughton electric routes be proceeded with by the tramways department. Mr. W. T. M'Laren, in seconding, urged that this was going to be a great saving. Mr. Baxter moved that the matter be recommitted.

Mr. Poole said he had had an opportunity of seeing some of the great electric systems on the other side of the Atlantic and the North Sea, and he was not satisfied that the present rails were sufficiently strong and heavy to carry electric cars. Mr. Sleigh said the conversion of the existing cars would save £1,700 on each car. The vehicle they were going to use was very much lighter than the ordinary electric car. It would be a great mistake not to utilise the rails they had to their utmost capacity. They would be able to get three, four, or more years' use out of them. The recommendation of the committee was approved.

EXETER

SUGGESTED SALE OF TRAMWAYS.

At a meeting of the City Council the Tramways Committee reported that the National Electric Construction Company, Limited, had inquired whether the Council was disposed to sell or lease the tramways undertaking. The committee recommended that the company be informed that the Council was not at present prepared to do so. It was decided that in order to give the Council a better opportunity of considering the matter, the tramways committee should make a fuller report to the next meeting. Mr. Munro said the finance committee had included in the estimates £4,000 for loss on the tramways, and he gave notice of motion that the committee consider the wages paid to the staff and the charges for electric current, with a view to a reduction, and in the event of their failure to obtain reasonable concessions, to consider the expediency of closing the undertaking. At a meeting of the City Council on May 31, Mr. Munro proposed this resolution, and said with regard to wages paid in 1914, motormen and conductors received £3,505, and in 1921 up to March last the figure was £10,072. The charge for electric current in 1914 was £3,827, and in 1921, £6,707. Mr. J. A. Lucas seconded, and after a discussion the motion was carried.

GATESHEAD.

CORPORATION'S PURCHASE OPTION.

The possibility of the Corporation exercising their option next year of purchasing the undertaking of the Gateshead and District Tramways Company is arousiug much local interest. "Apparently there is a marked opinion in favour of acquiring the system, which, under company control, has undoubtedly proved one of the most successful business concerns of the kind," said the *Newcastle Journal*. "On the other hand, there is a feeling that the undertaking would be too costly, particularly in view of the present financial burden of the town, and at such an inopportune period. A more likely estimation of the cost of acquisition than that which has already appeared in the local Press is about £500,000."

GLASGOW.

EMPLOYEES' REINSTATEMENT.

The Corporation Tramways Committee have considered the reinstatement of four employees who were dismissed on April 15 in consequence of their attitude in the event of a general strike. The committee heard Mr. J. Veitch, divisional representative of the Vehicle Workers' Union; Mr. Gee, local district secretary of the union; also the four former employees concerned, in support of the claim for reinstatement. It was unanimously decided to leave the matter in the hands of the general manager, Mr. J. Dalrymple, and the men were subsequently reinstated, after they had expressed regret for their action.

HALIFAX.

TRAMCARS AND MOTOR COACH COMPETITION—TRACK RECONSTRUCTION.

The Corporation Emergency Committee have made an arrangement with the local chars-a-bancs association under which licences will be issued to proprietors at a nominal fee, enabling chars-a-bancs to be run on the tramway routes when the tramcars are not in operation. The motor coaches had been running on Sundays over the tramway routes in the absence of the cars, and had also been competing with the tramcars in a few instances on weekdays. The Corporation Highways Committee held that such competition was illegal, and a sub-committee sought to levy a charge of 15s. per char-a-bancs per day, but the association protested, with the result that an agreement was arrived at as stated above. The Town Council have sanctioned applications for the borrowing of £36,050 for relaying portions of the tramway track on the Causeway Foot section, and £19,500 for relaying the track of the Pellon section.

HULL.

JAMESON STREET EXTENSION—DECORATED STANDARDS.

The Corporation Tramways Committee have obtained the consent of the Minister of Transport to the laying of tramways in Jameson Street for the purpose of carrying out the scheme adopted by the Council. It has been decided that three omnibuses shall be purchased, and a fourth, expected to arrive on approval shortly, if satisfactory. The general manager's suggestions as to the adoption of 2d. stages on the Stoneferry omnibus route have been agreed to. The committee have selected two colour suggestions of Mr. J. J. Brownsword, principal of the Municipal School of Art, for decorating the tramway standards, and propose to try these on six standards in the centre of the city.

ISLE OF MAN.

ELECTRIFICATION OR OMNIBUSES.

At a meeting of the Town Council of Douglas, Isle of Man, the tramway committee recommended that in view of the manager's representations as to impending capital expenditure on the Upper Douglas Tramways, steps be taken to obtain sanction to the substitution of motor omnibuses or electrical traction for the present cable system. Alderman Craine said at present the old Act compelled them to run cable cars excepting when sufficient reason was given otherwise. The Town Clerk mentioned that the Council had power to run omnibuses when the Omnibus Act received Royal assent, but not instead of tramcars. After a discussion the matter was referred back.

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LEEDS.

PROPOSED INCREASED FARES.

The Corporation have applied to the Ministry of Transport for powers to increase the maximum fares from one penny to twopence per mile, or "for such an increase as would enable the Corporation to avoid incurring a loss in the running of the tramcars." Several public bodies opposed the application, including the Town Councils of Morley and Pudsey, and the District Councils of Yeadon, Guiseley, Rawdon and Otley.

LONDON.

STRIKE AT POWER-STATION—TRAFFIC LEGISLATION—HOUNSLOW ROUTE.

An attempt to stop the County Council tramway service was made on Saturday, May 14, when a number of men of the Electrical Trades Union and General Workers' Union, employed at the Greenwich power-station, went on strike as a protest against the use of foreign coal imported from Belgium. The strikers formed the greater part of some 300 workpeople employed at the power-station, but they were mainly of the unskilled or semi-skilled class. The most highly skilled of the staff remained at their posts. The trouble had, however, been foreseen, and an adequate supply of volunteer labour from the London County Council office staff and others was rapidly forthcoming. The volunteers, who had been working continuously for over 24 hours, were relieved on the following Sunday evening by a party of naval ratings, who arrived under military escort. There was no demonstration.

Meetings of London tramwaymen were held in various parts to consider sympathetic action, and the question of whether they should continue to work the cars whose power was provided by non-union labour. The executive committee of the tramways section of the United Vehicle Workers' Union decided to take a ballot of their members on the matter. Considerable secrecy was observed over the result, and only the bare fact that the majority were against a strike was officially disclosed. It was understood, however, that this majority was a very large one. The attempted manœuvre was undoubtedly very unpopular with the rank and file of the tramwaymen. Even when Triple Alliance action was contemplated, the tramway workers were by no means enthusiastic, and the majority continued thoroughly opposed to action of a more drastic nature than had so far been contemplated by the railway men or transport workers over the embargo on imported coal. The strike at the power-station was settled at the beginning of June, and the men were being gradually reinstated. The Whit-Monday traffic on the London County Council tramways constituted a record, despite the fact that the coal shortage and the difficulties experienced at the power-station prevented an absolutely full service. Over £19,000 was received in fares from more than 2,000,000 passengers. "We feel exceedingly pleased with the fact in view of the task we had of generating power," a London County Council official stated. "It was a strain upon the volunteers at the power-station, to whom the greatest credit is due, and also to the conductors and motormen in the service." The traffic receipts were about £1,000 above any previous day's takings, but it was pointed out that while there may have been a record number of passengers, the increase in the takings was partly due to the rise in fares. The services of the London United, the Metropolitan, and the South Metropolitan tramways were also very heavily taxed at Whitsuntide. Mr. Lyle asked in the House of Commons what was the exact nature of the new legislative proposals affecting by-law control of London traffic. Mr. Neal (Parliamentary secretary, Ministry of Transport).—The proposals provide for the making of regulations in regard to the breaking up of streets, the control of traffic, vehicles of special descriptions, and to obstructions to traffic. I am unable to say whether they will be introduced in the House, but I am in consultation with the members representing London constituencies on the matter generally. The London United Tramways, Limited, having been asked to re-lay a section of the track in Staines Road, Hounslow, have proposed to abandon the section, and remove the rails and trolley wires on condition that the local authorities release them of their obligation to make up the surface of the road. The local authorities decided to consult the County Council on the subject, and urge that an omnibus service be guaranteed westward.

NEWCASTLE-ON-TYNE.

PROPOSED NEW LIGHT RAILWAY.

The Corporation is making application to the Light Railway Commissioners for an order to authorise the construction of a light railway commencing at North Gosforth in a junction with the Tyneside Tramways and Tramroads Company's line, and terminating at Long Benton at a junction with the Corporation's tramways.

ROTHERHAM.

NEW RAILLESS CAR—CORPORATION BILL.

The Corporation Tramways manager (Mr. T. P. Sykes) has reported that the first railless trolley vehicle on a new order—the chassis of which was ordered some time ago—has been put into service. The body was constructed at the tramway depot, and he estimated a saving to the Corporation thereby of £150. Reporting on a request for reduced omnibus fares, the manager says that up to December 31 the motor omnibuses owned by the Corporation sustained a loss of £354, and no lower fares will be possible unless the cost of wages and petrol drops. The Local Legislation Committee of the House of Commons, which has been considering the Corporation Bill, has agreed to the maximum tramway fare being twopence instead of three-halfpence per mile, in view of the greatly increased cost of upkeep. In regard to other tramway clauses, the general manager explained that the proposal was to construct two new tramways for the purpose of relieving the congestion of traffic at the centre of the town. The committee also passed the clause relating to the expenditure of £3,200 for omnibuses.

SHEFFIELD.

ALERT CONDUCTOR REWARDED.

At a meeting of the Tramways and Motors Committee on May 24, the chairman, Sir William Clegg, expressed on behalf of the committee their thanks to Conductor Egginton for a prompt action which, in addition to saving damage to a tramway car, was probably the means of avoiding injury to passengers, and presented him with a £5 note as a mark of the committee's appreciation. The motorman was taken ill as he was driving the car, which ran by the usual stopping place. The conductor realised that something must be wrong, and as his saloon was so full of passengers that he was not able to see through to the front of the car, he promptly pulled out the switch and stopped the car by the slipper brake from his own end.

SOUTHEND-ON-SEA.

PROPOSED RAILLESS TROLLEY CARS.

The Corporation Tramways Committee has asked the electrical engineer to report on the cost of providing and maintaining a small system of three railless trolley cars on the Prittlewell route. The committee also suggests Parliamentary powers be sought to enable the Corporation to establish such services.

TAUNTON.

TRAMWAYS CEASE OPERATION.

The tramways of the Taunton Electric Traction Company, Limited, ceased operation on Saturday, May 28, owing to the company being unable to come to terms with the Town Council concerning increased charges for power. The service has been running for 20 years, though since 1905 there have been no profits on the undertaking.

TYNEMOUTH.

CORPORATION AND TRAMWAY PURCHASE.

At the quarterly meeting of Tynemouth Town Council it was reported that Mr. H. A. Stagg, local director of the Tynemouth Traction Company, attended a meeting of the Tramways Committee and referred to the rights of the Corporation to purchase the company's undertaking within six months after December 31, 1922, or within six months after the expiration of every subsequent period of seven years. Mr. Stagg stated that his company did not feel justified in incurring any considerable capital expenditure for improvements if the Council were free to purchase the undertaking, and he inquired whether the Corporation desired to do so now, or whether they would grant the company a lease for a period of, say, 21 years. The Tramways Committee hope to lay a proposition before a meeting of the Council.

WALTHAMSTOW.

PENNY FARES ABOLISHED—NEW TOWER WAGON.

Penny fares have been abolished and a minimum of 1½d. substituted on the Urban District Council Tramways. The decision of a special meeting of the Council was put into effect after only 24 hours' notice. The workmen's former penny return fare is now 2d. The Council have been losing £3,000 a month on the tramways, and as last year's deficit amounted to £26,000, the Labour party, now in a majority, decided that the burden should at once fall on the travelling public instead of on the rates. The tramcars cater largely for visitors to Epping Forest. The Ministry of Transport has sanctioned the expenditure by the Council of £1,365 for the purchase of an electric tower wagon for the tramways department. The Ministry suggested that the loan should be repaid within a period not exceeding 20 years, but the Council proposes to repay the money within 10 years.

WIGAN.

TRAMWAY EXTENSIONS APPROVED.

The Local Legislation Committee of the House of Commons have approved clauses in the Corporation Bill by which the Corporation are empowered, by small new lengths of tramway, to make connections with their existing service within the borough. This will effect a saving of £1,000 a year. It was stated that up to 1920 the tramways and omnibus service paid, but that there was for that year a loss of £21,000. The Corporation therefore asked power to increase by 100 per cent. the maximum permissible fares. The cost of the tramway additions will be £8,850, and it is proposed to buy ten new omnibuses at £2,000 each.

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PERSONAL.

Sir Edward Smith has been re-elected chairman of the London Safety First Council.

Sir Edmund Wyldbore-Smith has accepted the chairmanship of the Metropolitan Carriage, Wagon and Finance Company.

Mr. Nevile Gwynne has been elected president of the British Engineers' Association in place of the retiring president, Col. O. C. Armstrong, D.S.O.

Mr. W. J. Mathews, sales manager of Newtons, Limited, has been appointed sole agent for the Electric Construction Company for the South-west of England.

York Corporation and Electricity Committee have recommended that the salary of **Mr. J. W. Hame,** city electrical engineer and tramways manager, be increased to £900 per annum.

Mr. G. A. Newsome, general manager and engineer of Darwen Corporation Tramways, has been granted an increase in salary of £50 a year, with further increases of £25 in each of the next two years.

Mr. A. H. Martin, who has been on the traffic staff of the Bristol Tramways and Carriage Company, for the past 16 years, has been appointed traffic superintendent to the Northern General Transport Company, Chester-le-Street, Durham.

Mr. H. E. Blain, joint managing director of the London Underground group of companies, who has been asked to advise the Transportation Commission of Toronto on its transportation problem, sailed on the "Olympic" on May 25.

Mr. Ben Hall, general manager of the Wigan Corporation Tramways, has been presented with two antique pattern armchairs of the Stuart and Jacobean periods by the staff and employees of the department prior to his leaving for Halifax.

Mr. Washington Hall, who was secretary of the Potteries District of the late British Electrical Friendly Society for 18 years, has been presented with a wallet of Treasury notes by employees of the Potteries Electric Traction Company, at Stoke.

Halifax Tramways Committee has recommended the Council to grant an honorarium to **Mr. J. W. Galloway,** the tramways engineer, for his extra services during the illness of Mr. J. D. Caird, the traffic manager, and until the new general manager commences duty.

Sir Gilbert Claughton has, owing to failing health, resigned the chairmanship of the London and North-Western Railway Company, and the deputy-chairman, the **Hon. Charles N. Lawrence,** has been unanimously elected chairman in his stead. Sir Gilbert Claughton retains his seat on the Board.

The Rt. Hon. J. H. Whitley, M.P., having become Speaker of the House of Commons, has resigned the joint presidency of the Industrial League and Council, which he has long held in conjunction with the Rt. Hon. G. H. Roberts, M.P. Viscount Burnham, C.H., has consented to become joint president.

Mr. R. O. Willmott, who for the past fifteen years has been in the service of R. W. Blackwell and Company, Limited, latterly as sales manager, has terminated his connection with that firm. As Mr. Willmott contemplates commencing business upon his own account he would be glad to receive catalogues and price lists from firms interested in traction supplies. His address is 13, Alexandra Park Road, Muswell Hill, London, N.10.

OBITUARY.

We regret to record the death of **Mr. Edmund Francis Vesey Knox, K.C.,** which occurred at Shimah, Newcastle, County Down, on Sunday, May 15. Mr. Knox, who was 56 years of age, retired from practice at the Bar last February owing to ill-health. He was educated at Keble College, Oxford, and at the time of his call to the Bar, at the age of 24, was a Fellow of All Souls. In 1890 he entered the House of Commons, and retired in 1899. He was elected a Bencher of Gray's Inn in 1906, and became treasurer several years later. Mr. Knox was for some years a member of the Council of the Tramways and Light Railways Association.

The Late Mr. C. L. Oechsner.—We regret to record the death, on May 15, of Mr. Charles Louis Oechsner, of the British Thomson-Houston Company. Mr. Oechsner had been unwell for some time, and went to Bournemouth at Easter to recuperate. A week later he took to his bed and passed away as stated. Born on March 26 1866, at New Orleans, U.S.A., Mr. Oechsner had been associated with various activities of the British Thomson-Houston Company since 1888, joining the London staff in 1899, and the Rugby staff in 1901. He will be greatly missed, not only by his many friends in the B.T.H. organisation, but by those who knew him during his long association with the company. Mr. Oechsner's genial personality made him a large circle of friends in the engineering world. The funeral took place at Bournemouth on May 19.

RECENT PUBLICATIONS.

HOLLINGS AND GUEST, LIMITED, engineers, of Thimble Mill Lane, Birmingham, have issued a revised illustrated list (No. A113) of their hydraulic forging and flanging presses, hydraulic rivetters, and also suitable pumps and accumulators for working these.

"MUNICIPAL YEAR BOOK."—This well-known annual has been issued for the year 1921-22 by the *Municipal Journal, Limited,* Sardinia House, Sardinia Street, W.C.2, at 21s. net. The book is an encyclopædia on municipal activity throughout the country, and is an indispensable guide.

STERLING TELEPHONE AND ELECTRIC COMPANY have issued an attractive brochure containing some 40 photographs which illustrate the activities of the firm as manufacturers of telephones, wireless telegraph instruments, and a large variety of electrical equipment of a similar kind. Their fine modern works are at Dagenham, Essex, and the London offices are at 210-212, Tottenham Court Road, W.1.

ALUMINIUM IN CAR CONSTRUCTION.—The many uses to which sheet aluminium may be put are the subject of an informative brochure issued by the British Aluminium Company, Limited, of 109, Queen Victoria Street, E.C.4. It is pointed out that the metal's outstanding properties are, of course, its lightness, its inertness in chemical action, its ductility and malleability. These characteristics render aluminium suitable for various parts in tram-car construction, including panels, nosing and beading, window frames, ventilators, trolley heads, etc.

T.B.R. (TRAVEL BY ROAD).—A motor omnibus and coach guide for England and Wales has been issued by Rieu, Wiley and Company, Limited, 123 Pall Mall, price 1s. The guide has a map of England and Wales, showing motor omnibus routes, an index of towns and villages, and a time-table. Inter-urban tramways are included as forming a useful connection between road and railway transport. Lord Montagu has contributed a preface to the first issue, because he "considers the publishers deserve the gratitude of the public travelling by road for having compiled such a useful book of reference."

CONTRACTS AND ORDERS.

The General Electric Company, Limited, has secured the half-yearly contract for the supply of metal, gas-filled, and carbon filament lamps to H.M. Office of Works. The contract comprises many thousands of lamps, and the fact that it has again been obtained by the General Electric Company is a striking proof of the satisfaction afforded by Osram lamps.

Bradford Tramways Committee has re-affirmed its original decision to place an order for 100 steel tires with the Anglo-Belgian Improvements Corporation. An error has been made in tendering in respect of the class of steel, and it has been contended that the Corporation had not subsequently given English tenderers proper opportunity. The committee has accepted the tender of Hadfields, Limited (Sheffield), for points and crossings for renewal of track at £3,110.

Victorian Commission Accepts U.S. Tender.—A Reuter's message from Melbourne states that the Victorian Electricity Commission has accepted the tender of a U.S.A. firm for switchgear and transformers amounting to £379,000. No British firm put in a single complete tender, and it is reported that the Commission expect to make a saving of £200,000 by accepting the single American tender rather than a combination of tenders made by various British firms.

Wolverhampton Tramways Committee has decided that to comply with the requirements of the Ministry of Transport, alterations in the specification for the supply of the eight single-deck tramcars in course of construction by the Brush Electrical Engineering Company, Limited, be approved, and that application be made to the Ministry for sanction to a loan of £280 in respect of the extra cost. They have also resolved that the quotation of the English Electric Company, Limited, amounting to £55 for the supply of 29 lightning arresters, be accepted.

South Shields Extensions.—At the Corporation Tramways Committee the manager (Mr. J. C. Whiteley) asked for instructions regarding the purchase of materials for the light railway and tramway extensions. A sufficient quantity of material required for the Mile End Road extensions was already in stock, but it would be necessary to purchase about 540 tons of rails, together with the necessary fishplates, tie bars, etc., for the light railway. The manager had obtained quotations for rails which vary considerably. He stated he had located a quantity of rails which are of a very suitable type for a light railway. They were rolled at Middlesbrough in 1920, and could be delivered in South Shields at £14 10s. per ton. The committee resolved that the manager be authorised to purchase the rails required from Dorman, Long and Company, of Middlesbrough, at this price.

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PATENT LIST

Abstracted for "The Tramway and Railway World" from the Official Journal of Patents.

*** If the inventions have been communicated the names of the communicators are given in italics.

APPLICATIONS FOR LETTERS PATENT.

The number of the patent is given in brackets.

Rear axles for motor vehicles (12,499)—Albion Motor Car Company, Limited, and T. B. Murray.
Trailer vehicles (12,757)—S. E. Alley.
Joint for tramway rail (13,041)—L. P. Davies and K. James.
Rail joints (12,775)—L. Ekberg.
Means for conveying electric current from overhead wires to tramcars (12,744)—C. G. Millington and W. Sharp.
Motor vehicles (12,613)—A. J. Purdy.
Controlling mechanism of tramway switches (12,917)—S. S. Wrightson.
Braking devices (13,171)—M. Birkigt.
Life-guards for motor vehicles (13,357)—G. Daws.
Motor vehicles (13,096)—R. R. Forman.
Trolley guiding device for electric tramcars (13,231)—G. A. Lister.
Life-guard for trailers (13,134)—W. H. Metson.
Means for drying tramcars, etc., seats (13,569)—G. Robinson.
Life-guards for motor vehicles (13,357)—E. Silk.
Current collecting shoes (13,668)—J. D. Twinberrow.
Tramway rails (13,098)—A. V. Vowles.

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Direction indicators for road vehicles (13,686)—E. J. Bailey.
Steering gear for mechanically propelled vehicles (14,249)—R. Bishop, H. W. Egerton and Marles Steering Company, Limited.
Mechanical direction and stop indicator for motor vehicles (13,887)—B. W. Coopey and T. Rideout.
Direction indicators for road vehicles (13,686)—A. C. Hanson.
Indicator for motor vehicles (14,062)—H. W. Hunt.
Signal for motor vehicles (13,827)—A. E. Knight.
Means for locking change speed levers of motor vehicles (14,104)—H. J. Lee.
Steering gear for mechanically propelled vehicles (14,249)—Marles Steering Company, Limited.
Means for lubricating armature and axle bearings of tramcars (13,819)—H. Murgatroyd.
Propulsion of vehicles (13,892)—H. Orley.
Anchoring clamp for overhead electric lines (14,135)—I. Prinetti.
Motor vehicle transmission (13,836)—J. D. Roots.
Motor vehicles (14,418)—E. Bailey, A. F. and C. J. Clarke, A. J. Clifford and the Utility Manufacturing Company.
Steering gear for mechanically propelled vehicles (14,348)—R. Bishop, H. W. Egerton and Marles Steering Company, Limited.
Rail joints (14,613)—W. E. Bryan.
Axles of motor vehicles (14,648)—H. M. Butler.
Girder rails for tramways (14,391)—J. Illingworth and H. C. Wood.
Bases for trolley poles for electrically propelled vehicles (14,295)—E. M. Munro.
Variable ratio power transmission gears for motor vehicles (14,494)—W. Blair and Rudge Whitworth, Limited.
Steering wheel for motor vehicles (14,844)—S. Upton.

SPECIFICATIONS PUBLISHED

1919.

Radiators for the engines of motor vehicles (27,638—*161,220*—G. Clark.
Change speed gear for self-propelled vehicles (28,065—*161,613*)—J. H. Chambers.
Lifting jacks (31,166—*161,627*)—A. E. White (*McKiernan-Terry Drill Company*).
Lifting jacks (25,541—*162,006*)—A. H. F. Hern.
Self-propelled vehicles (29,818—*162,328*)—J. Landon and F. W. Martyn.

1920.

Change speed gearing for self-propelled tramcars (836—*161,299*)—G. Ashton.
Apparatus for the transmission of power in motor vehicles (1,031—*161,305*)—G. S. Mepstead.
Tramway rails (5,852—*161,405*)—K. Olsen.
Gear boxes for motor vehicles (10,502—*161,444*)—T. B. Murray and Albion Motor Car Company, Limited.
Change speed gears for motor vehicles (25,805—*155,232*)—Oesterreichische Waffenfabriksges.
Locking devices for levers controlling tramway signals (1,449—*161,694*)—F. Downes, C. J. Cooke and W. D. Rogers.
Motor-driven road vehicles (4,137—*161,771*)—A. V. Blake.
Tramway rail beds (4,560—*161,775*)—H. M. Dudgeon and A. C. Baker.
Trolley heads for overhead electric traction (15,912—*161,866*)—H. George.
Means for adjusting brake shoes for tramcars (1,955—*162,073*)—S. Thomas.
Motor charabancs (3,149—*162,106*)—G. W. Browne.
Motor vehicles (17,792—*145,618*)—Daimler Motoren Ges.).
Steering arrangement for trailers (17,959—*145,687*)—A. Arato.
Motor vehicles (2,072—*162,358*)—A. H. G. Girling and H. Collier and Sons, Limited.
Change speed gear for motor road vehicles (2,568—*162,383*)—A. R. N. Heath and J. and E. Hall, Limited.
Starting apparatus for motor vehicles (4,798—*162,442*)—G. Lambert.
Lifting jacks (7,174—*162,482*)—D. T. Jones.
Lifting jacks (7,881—*162,490*)—C. F. L. King.
Fishplates for rail joints (10,141—*142,797*)—L. M. Smith.
Radiators for motor-driven vehicles (18,946—*147,003*)—H. Junkers.

NEW METHOD OF TRACTION.

Lord Milner has accepted the chairmanship of a new company to be known as Roadrails, Limited, which will operate a type of traction known as the Stronach-Dutton Roadrail System. The patentees are Brigadier-General R. S. Stronach, C.B.E., late director of Roads and Bridges, War Office, and Major F. H. Dutton, M.I.M.E., of the South African Railways. The discovery is reported to be based on the fact that the maximum tractive effort is obtained from an engine running not on rails but on wheelways of a roadlike surface, while the minimum of tractive resistance is obtained from carrying the load in trucks on rails. The capital is £600,000 in ordinary £1 shares; there are no debentures. According to the *Financial Times*, its financial programme is to charge a royalty wherever the company's system is used in respect of each mile of roadrail track laid, and, in addition, where a concession is granted a capital payment is required. The directors, in addition to Lord Milner, include Brigadier-General Stronach, C.B.E. (vice-chairman), Mr. H. T. Baker, Lieut.-Col. A. O. Borton, V.C., D.S.O.; Mr. John Buchan, and Colonel A. Weston Jarvis.

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TRAFFIC RETURNS.

Tramway and Omnibus Undertakings in the United Kingdom.

NAME OF COMPANY OR CORPORATION.	1920. WEEKS ENDED					1921. WEEKS ENDED					AGGREGATE.		
	May 8	May 15	May 22	May 29		May 7	May 14	May 21	May 28		Wks.	1921.	Increase or Decrease.
	£	£	£	£	£	£	£	£	£	£		£	£
Aberdeen Corporation	3,197	3,259	3,290	3,533	...	3,221	2,623	1,668	1,721	...	51½	189,484	+ 23,015
Aberdeen Motor Buses	...	...	...	...	...	...	...	445	606	...	19	3,152	—
Ayr Corporation	642	581	591	679	...	619	608	534	672	...	2	1,207	— 63
Barrow Corporation	747	797	801	1,163	...	899	819	1,164	922	...	8	7,262	+ 619
Belfast City Tramways	11,318	11,520	11,803	12,584	...	13,687	12,972	13,204	13,128	...	8	106,225	+ 12,059
Birkenhead Corporation	2,984	2,994	3,046	3,338	...	2,390	2,324	2,645	2,296	...	8½	20,982	— 4,666
Birkenhead Motor 'Buses	302	312	367	522	...	609	686	975	760	...	8½	5,418	+ 2,623
Birmingham Corporation	28,003	28,450	28,050	30,648	...	30,571	29,479	30,356	25,561	...	8	249,220	+ 11,827
Birmingham Motor 'Buses	1,913	2,138	2,042	2,808	...	2,081	2,087	2,902	2,410	...	8	18,276	+ 974
Blackburn Corporation	2,242	2,313	2,439	3,669	...	1,732	1,102	1,530	1,157	...	8½	18,253	— 3,843
Bradford Corporation	11,874	13,000	12,291	15,234	...	12,182	12,007	14,706	10,940	...	9	112,162	+ 4,478
Burnley Corporation	3,413	3,531	3,451	4,178	...	948	1,445	2,450	2,607	...	—	—	—
Burton-on-Trent Corporation ...	553	530	570	643	...	644	686	646	561	...	8	5,245	+ 462
Bury Corporation	2,479	2,583	2,673	3,001	...	2,229	1,950	2,502	2,176	...	8½	20,803	— 1,576
Chatham and District	1,697	1,734	1,707	2,263	...	1,680	1,458	1,816	1,550	...	21	34,258	+ 1,398
Derby Corporation	2,080	2,168	2,215	2,641	...	1,919	1,939	2,321	1,614	...	8	17,768	— 1,119
Dundee City	2,622	2,677	1,890	2,827	...	3,473	3,368	1,825	3,526	...	1½	4,908	+ 975
East Ham Corporation	1,740	1,717	1,783	2,081	...	2,125	1,989	2,464	2,004	...	8½	17,695	+ 2,832
Edinburgh Corporation	11,481	11,850	*14,186	*14,739	...	12,025	12,907	*11,961	*14,784	...	2	28,245	+ 2,268
Edinburgh Motor 'Buses	560	567	610	642	...	3,720	4,479	3,630	8,520	...	2	12,150	+ 10,898
Glasgow Corporation	34,239	34,420	34,014	35,746	...	49,955	49,350	49,844	51,093	...	51	2,369,002	+ 668,241
Glossop (Urban Elec. Supply Co.)...	252	238	232	277	...	269	242	246	219	...	22	5,282	+ 151
Halifax Corporation	3,560	3,699	3,798	5,343	...	4,432	3,503	4,969	3,909	...	6½	32,512	+ 1,112
Halifax Motor 'Buses	116	114	124	146	...	103	95	138	109	...	6½	842	— 87
Huddersfield Corporation	4,631	4,904	4,781	6,570	...	5,500	5,391	7,351	5,349	...	9	46,371	+ 13,321
Ilford U.D. Council	1,214	1,271	1,256	1,513	...	1,541	1,567	1,832	1,572	...	8½	12,930	+ 2,452
Ipswich Corporation	882	927	970	1,292	...	733	710	839	675	...	8	6,633	— 1,438
Isle of Thanet...	843	883	942	1,688	...	705	725	1,149	910	...	33½	21,450	— 1,267
Kilmarnock Corporation	367	432	344	332	...	387	426	342	370	...	1½	713	+ 36
Leicester Corporation	6,771	6,970	6,981	8,111	...	5,628	3,012	4,058	3,188	...	—	—	—
Liverpool Corporation	27,312	28,247	27,466	31,155	...	24,845	24,358	27,277	26,844	...	21½	582,574	+ 22,478
London County Council	84,035	85,168	85,365	94,337	...	102,624	99,100	104,329	100,376	...	8	781,835	+ 120,110
Maidstone Corporation	462	458	450	592	...	471	403	500	420	...	8	4,023	+ 99
Manchester Corporation	30,780	32,069	31,460	3,441	...	40,370	39,410	45,167	40,968	...	8	352,701	+ 116,994
Newcastle-on-Tyne Corporation ...	10,745	10,790	10,760	11,596	...	10,532	10,506	11,096	10,375	...	7½	90,260	+ 4,813
Nottingham Corporation	7,603	7,654	7,664	9,317	...	5,887	4,946	3,503	2,998	...	8	45,385	— 18,191
Oldham Corporation	4,643	4,804	5,142	5,078	...	4,354	5,043	5,567	4,921	...	10	45,019	+ 4,047
Reading Corporation	1,556	1,630	1,584	2,023	...	1,411	1,409	1,700	1,394	...	8	12,285	— 1,119
Reading Motor 'Buses	179	195	188	284	...	334	302	498	388	...	8	2,732	+ 1,115
Rotherham Corporation	2,642	2,724	2,694	3,051	...	2,118	1,965	2,150	2,227	...	7	14,811	— 3,869
St. Helens Corporation	1,862	1,890	1,933	2,574	...	1,812	1,664	2,037	1,789	...	8	13,831	— 1,243
Sheffield Corporation... ...	20,431	20,804	23,117	21,163	...	17,501	19,070	21,995	19,069	...	8½	162,508	— 12,582
Southampton Corporation	2,991	3,164	3,136	3,876	...	2,273	2,117	2,650	2,331	...	8	20,990	— 2,809
Southampton Motor 'Buses	195	215	213	280	...	386	392	413	431	...	8	2,048	+ 134
Southend Corporation	1,784	1,859	1,910	3,170	...	1,472	1,236	2,029	1,825	...	8	13,463	— 3,065
South Shields Corporation	1,837	1,896	1,911	2,241	...	1,405	1,412	1,675	1,610	...	—	—	—
Sunderland Corporation	2,926	3,008	3,094	3,577	...	2,001	2,312	2,754	2,358	...	8	19,970	— 5,956
Swindon Corporation	362	386	369	473	...	419	385	482	425	...	7½	3,156	+ 89
Tyneside Tramways and Tramroads	1,055	1,098	1,106	...	...	1,120	1,064	1,603	...	...	20	23,912	+ 2,371
Wallasey Corporation	2,426	2,565	2,439	3,397	...	2,583	2,420	3,123	2,762	...	8½	22,453	+ 695
Wallasey Motor 'Buses	151	174	157	277	...	194	278	315	295	...	8½	1,966	+ 529
Walsall Corporation	1,743	1,742	1,724	2,246	...	1,610	1,661	1,956	1,552	...	9	13,956	— 1,252
Walsall Motor 'Buses	1,001	975	955	1,380	...	862	848	1,297	782	...	9	7,703	— 1,120
Walthamstow U.D. Council	1,860	2,219	2,150	2,866	...	2,181	2,208	3,038	2,323	...	8½	18,385	+ 774
Warrington Corporation	1,003	979	984	1,065	...	1,066	1,016	898	803	...	8	7,914	— 18
West Ham Corporation	5,657	5,555	5,417	6,450	...	6,054	5,119	6,345	5,166	...	8	46,757	+ 1,468
Wolverhampton Corporation ...	2,328	2,336	2,293	3,344	...	2,342	2,221	3,225	2,252	...	8	18,560	— 1,354
Wolverhampton Motor 'Buses ...	381	377	370	460	...	620	600	907	665	...	8	5,056	+ 1,943

* Figures include receipts from both Electric and Cable Cars.

Colonial and Foreign Tramway Traffic Returns.

Companies Issuing Weekly Returns.

NAME OF COMPANY.	1920. WEEKS ENDED					1921. WEEKS ENDED					AGGREGATE.		
	May 8	May 15	May 22	May 29		May 7	May 14	May 21	May 28		Wks.	1921.	Increase or Decrease.
	£	£	£	£	£	£	£	£	£	£		£	£
Anglo-Argentine	81,150	80,150	79,317	78,054	...	80,726	81,480	82,017	83,290	...	21	1,695,094	+ 122,712
Calcutta ... ... Rs.	94,776	92,583	91,986	89,970	...	86,195	85,175	82,685	77,837	...	24	1,505,936	— 441,773
Madras... ... ... Rs.	(2 weeks)	54,473	(2 weeks)	49,601	...	(2 weeks)	51,072	(2 weeks)	50,343	...	21	346,295	— 39,332
Pernambuco	7,081	6,256	7,001	6,661	...	3,450	3,300	3,375	3,403	...	21½	87,611	— 76,134

Companies Issuing Monthly Statements only.

	1919.	1920.					1920.	1921.					Wks.	AGGREGATE.	
	Dec.	Jan.	Feb.	Mar.	April	May	Dec.	Jan.	Feb.	Mar.	April	May		1920-21.	+ or —.
	£	£	£	£	£	£	£	£	£	£	£	£		£	£
Ballarat & Bendigo	5,119	4,249	4,279	4,182	...	...	5,342	4,593	4,700	4,934	...	...	52	57,165	+ 7,306
Brazilian Trac. Mlrs	9739,000	9655,000	9381,000	9900,000	10245000	...	12600000	12875000	11941000	13102000	13562000	...	17	51,480,000	+ 12,299000
British Columbia	$783,324	828,709	746,030	761,182	...	...	868,677	868,202	792,590	816,452	...	...	39	7,186,953	+ 629,116
Buenos Ayres L'c'z.	55,873	52,643	52,468	55,000	53,429	54,563	62,857	61,111	53,952	59,365	60,238	58,492	48	629,444	+ 67,765
Burma	43,571	41,750	...	45,117	44,673	...	50,481	50,036	...	50,930	50,159	...	39	458,985	+ 56,572
Cape Town ...	...	...	...	...	...	...	29,768	...	...	...	27,662	...	—	—	—
Carthagena & H. ...	2,923	4,748	4,008	3,493	5,482	5,313	5,560	3,877	2,839	2,226	2,329	1,602	21	12,873	— 10,171
Cordoba	14,923	16,350	16,915	18,522	...	...	19,307	18,703	18,600	21,736	...	...	52	237,522	+ 36,887
East India ...	2,916	2,988	3,001	3,592	3,916	3,980	4,271	4,299	3,819	4,168	4,560	4,392	44	42,379	+ 10,830
Kalgoorlie	2,560	2,573	2,677	...	...	...	3,140	2,418	*316	...	...	...	8	2,734	— 2,516
La Plata	...	*3,145	5,892	6,392	6,142	...	...	6,506	*727	3,404	5,878	...	17	16,516	— 5,066
Lima	...	...	56,162	...	...	...	...	...	60,718	...	...	...	8	124,329	+ 9,593
Manila ...	$276,730	278,451	278,437	263,690	254,103	...	315,599	321,450	306,389	298,317	279,535	...	17	1,205,691	+ 132,260
Monte Video ...	...	...	45,259	...	...	42,401	...	...	48,119	...	...	46,579	30	333,456	+ 26,157
Para	24,412	24,306	24,292	24,872	24,760	...	24,253	24,231	22,596	24,240	24,340	...	21	119,660	— 2,982
Port Elizabeth ...	...	...	...	...	...	...	8,185	...	...	...	7,082	...	—	—	—
Rangoon	7,517	R112000	115,000	130,470	...	...	8,000	R122558	120,718	158,121	...	...	13	401,427	+ 43,927
Toronto ... $	...	1130,486	1113,717	1255,668	...	...	...	1274,251	1228,722	1318,273	...	...	13	3,821,246	+ 321,375
Winnipeg ... $	...	498,837	444,873	456,915	...	...	...	506,229	460,125	495,208	...	...	13	1,461,562	+ 60,937

* Strike of employees.

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RECENT DELIVERIES
of
DAIMLER 2-3-TON COMMERCIAL CHASSIS

ROBINSONS MOTORS LTD., SCARBOROUGH
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RICHMOND GARAGE, RICHMOND
WESTCLIFF-ON-SEA MOTOR CHAR-A-BANC CO.
W. CRAWFORD & SONS, BRIDGWATER
ASHTON-UNDER-LYNE CORPORATION
CLIFTON & KERSLEY COAL COMPANY
MANDENO SONS & HEWITSON, LIVERPOOL
G. FOWLER & CO., COWES, ISLE OF WIGHT
CROSVILLE MOTOR CO. LTD., CHESTER
DAVENPORT (C. B.) LTD., BIRMINGHAM
BUTTERLEY COMPANY LTD., DERBY
GLAMORGAN COUNTY ASYLUM, BRIDGEND
W. H. FURPHY, ESQ., LIVERPOOL
HEREFORD & MONMOUTH TRANSPORT CO. LTD.
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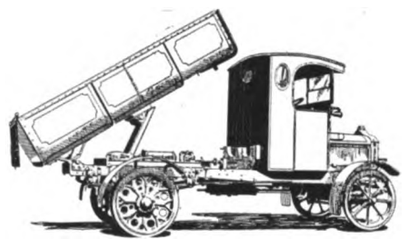

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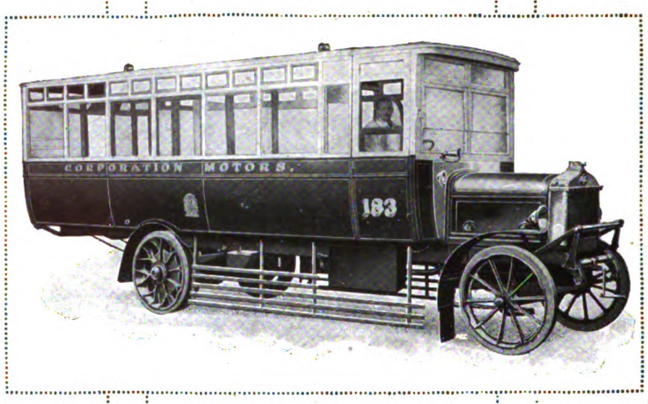

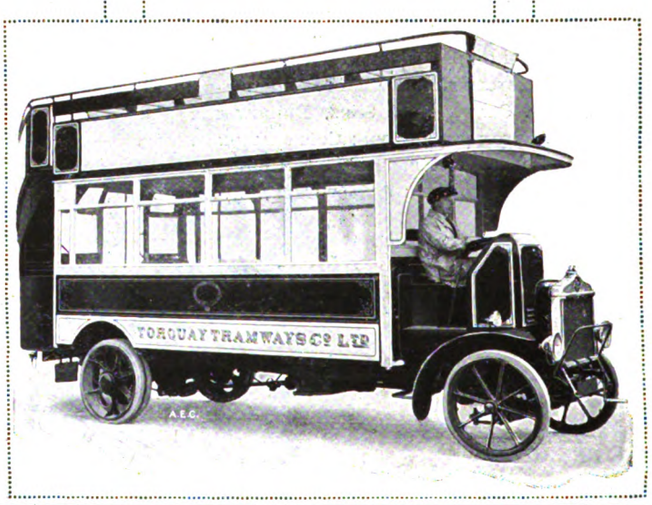

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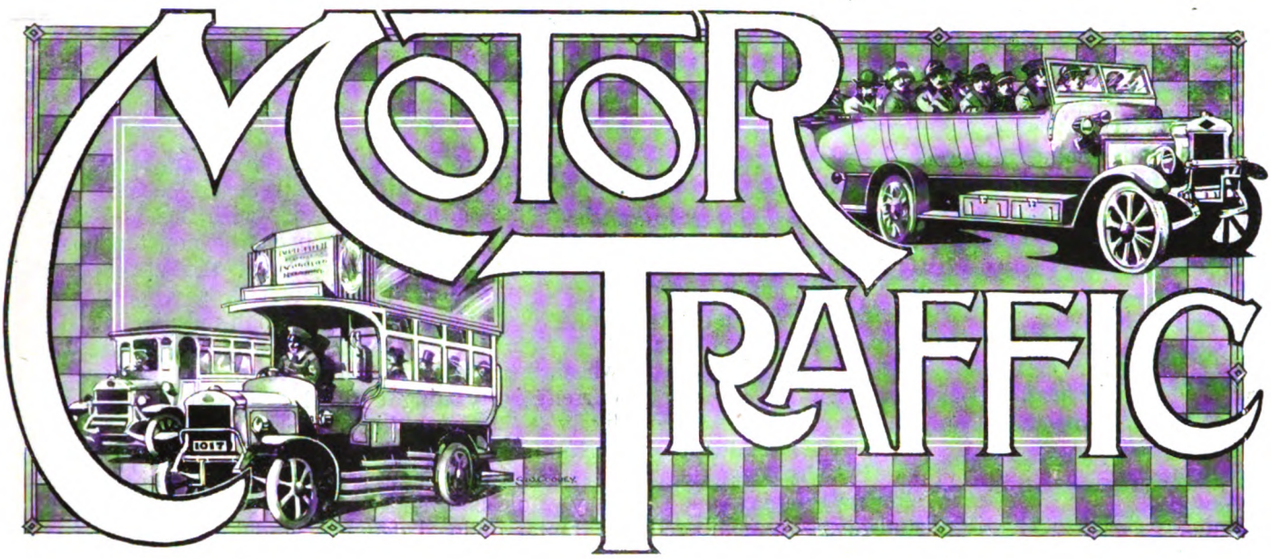

SPEEDS AND WEIGHTS.

It is no exaggeration to say that the whole future of the commercial motor vehicle now hangs in the balance, and the movement of that balance must almost entirely depend on the decisions of the Departmental Committee of the Ministry of Transport appointed to deal with the regulations affecting the use of motor vehicles. This Committee is, of course, not the final authority, and whatever its decisions may be they are not necessarily endorsed by the Minister, and neither will the House of Commons necessarily accept the views of the Minister himself. In practice, however, it is almost certain that the decisions of the Committee will form the basis of the law which will take the place of the old Heavy Motor Car Order, subject possibly to amendments, but not at all likely to be fundamentally altered after the Committee's report and conclusions have been published.

It has, of course, been anticipated all along that any changes that might be proposed would be in the direction of permitting somewhat higher speeds to vehicles of given weights, and that every precaution will be taken to make the regulations such as not to endanger the legal and at the same time the economical use of vehicles of the types now on the road or standardised for production by manufacturers. It is assumed that when the new law has been devised and passed there will be a more rigid insistence upon its observance than has been noticeable in respect of the Heavy Motor Car Order. This order has become more and more obsolete year by year, and it is common knowledge that it has not been strictly observed either as regards speeds or as regards vehicle weights. Strictly speaking, some vehicles now in use are illegal upon the roads. Of the remainder the great majority are from time to time illegally used.

POSSIBLE RESTRICTIONS ON DESIGN AND USE.

If we are to have a new law which is to be observed, it must be eminently reasonable. The position as regards the old law shows that it was unnecessarily restrictive, since it is so commonly broken without that public protest which would have resulted if the breaking of the law had occasioned undue danger or damage of any kind. It is, of course, impossible to say just what may be in the minds of the Departmental Committee at the moment. The members of such a Committee are, however, more or less dependent on guidance received from outside. The result is that the proposals under consideration by the Committee naturally become to some extent known to those intimately connected with the motor transport movement. The danger is, so far as one can judge, that the Committee may conceive it to be its duty to encourage such tendencies of design as it considers desirable, to an extent which may mean the definite discouragement of the use of what are now standard designs. The Committee may in effect say, "If you design a new type of 3-4 ton vehicle, cutting down the weight and at the same time fitting larger wheels, we will advise that this new type shall be allowed to travel at higher speeds than are at present legal. If, on the other hand, you continue to market existing types, we will make this policy unprofitable to you by framing a law such that your speed limits will be unduly low, and it will be impossible for you to secure decent economy of transport."

The Committee might, in fact, take up rather the same position as the police authorities occupy in respect of the licensing of motor omnibuses. The two cases, of course, are not on all fours. The London motor omnibus is a special proposition. It runs mainly in crowded streets and along residential thoroughfares. It is particularly necessary to protect the owners of property against any sort of nuisance. The omnibuses are constantly working at frequent intervals along certain defined roads of known quality, and it is well known that the effect on the road resulting from running a frequent service of vehicles of identical type is apt to be much more serious than the consequence of running, intermittently, vehicles of varied types. Moreover, it is not absolutely essential that the chassis of a London motor omnibus shall be perfectly suited to other uses elsewhere. On the other hand, when we consider the general proposition of the commercial motor vehicle, we must certainly not discourage types generally suitable for a variety of purposes everywhere. Furthermore, if we make our own laws such that the cost of vehicle construction is pushed up, and the difficulty and expense of loading and unloading is increased, the standard products of our industry, built primarily for use at home, will have no chance in open competition in overseas markets. This would mean that manufacturers would either have to depend entirely on home trade or to sub-divide their output into home and oversea types, with a consequent loss

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MOTOR TRAFFIC

of economy in manufacture. In itself, a large wheel is desirable from the standpoint of the road, but generally undesirable from the standpoint of quick and cheap loading and unloading. Any law which would differentiate seriously against the use of existing types, so decreasing their market value, would in effect entail the scrapping of enormous quantities of material already in the factories. The whole problem has to be approached with the utmost care, and also with a full realisation of the fact that, since the Heavy Motor Car Order was established, very great progress has been made, with the result that speeds, then objectionable, are now perfectly reasonable, and, in fact, desirable as tending towards economy. We must also renew an old warning to the effect that it must always be remembered that the roads must be built for the traffic, and that economy in road maintenance does not necessarily mean economy in road transport. An increase in the cost of the former is justified if it means a greater increase in the cost of the latter; whereas, if we frame our laws purely with regard to the views of those responsible for the upkeep of roads, we should merely secure an admirable system of highways at the expense of debarring ourselves from the privilege of making proper use of them.

SOME VALUABLE STATISTICS.

In view of the nature of the present scheme of motor taxation there must necessarily be now in existence a series of statistics which, if compiled and published, would be of very great value to all concerned in the provision of motor transport vehicles. The registration authorities have particulars of all the machines registered in the various classes. For example, among goods-carrying vehicles the payment made in respect of each machine is a safe indication of the classification of that machine from the standpoint of unladen weight. Very many of the statistics that one sees from time to time are valueless for lack of proper sub-division. For example, one cannot learn much by being told that so many thousand commercial vehicles are in use in, or have been imported into, a given country during a given year. We do not know whether the total represents mainly 5-tonners or light vans. There is no indication as to whether the demand is, say, for 30-cwt. vehicles or for 3-4 tonners. The figures are, in fact, useless as a guide to anyone who wants to know the nature of the demand because he wishes to create a suitable supply. At present we have merely been told the number of vehicles licensed as commercial vehicles during the first three months of this year and the total revenue produced by their taxation. This is not much good to us, but if we knew how many vehicles weighing between one and two tons, how many weighing between two and three tons, and so on, were in use, we should be in a far better position to estimate the demand, and manufacturers and importers would be assisted in their efforts to provide a suitable supply. Similarly, when we turn to the public service vehicle, it would be valuable to knlw not the mere total number of vehicles in use, but how many vehicles of any given seating capacity are employed. This would, of course, be revealed immediately by the returns of the taxation applied to them.

Such figures published year by year would steadily gain in interest and value. When it became possible to compare the figures of 1922 with those of 1921, we should see just what had been the new tendencies of the year. We should find that the use of certain classes of vehicle had increased, say, 50 per cent., while the use of other classes had only increased, say, 10 per cent., and so we should be able to learn not only what the past demand has been, but which way the current is running and what the future demand is likely to be. All this information would help manufacturers to produce the right thing in the right quantities, and if the figures were divided up into districts they would be even more useful as showing the varying character of local demands and indicating what type of vehicle is on the whole the most suitable under a given state of local conditions. The work of getting out the figures, while not negligible, should be by no means prohibitive, and when the motoring community is asked to pay so much in respect of taxation, it is surely reasonable that it should be given any slight return of this kind.

STARTING FROM COLD ON ALCOHOL.

The difficulty of starting from the cold has always been quoted as one of the main arguments against using alcohol alone as a fuel, and those with an eye to the future will therefore be very glad to hear that the committee formed by the Institute of Science and Industry of Australia has apparently solved the problem. It seems that the solution lies in starting up with a mixture only very slightly compressed. To produce the necessary conditions for easy starting, the admission of air is controlled and apparently the best results are obtained when the engine is first primed with a little alcohol fuel. In one demonstration of the method the cylinders of the engine were packed in ice, but the start on alcohol was effected without difficulty.

ROAD-SIDE PETROL PUMPS.

At the annual meeting of the Incorporated Society of Inspectors of Weights and Measures, Major A. Cooper-Key, H.M. Chief Inspector of Explosives, read a paper on bulk storage of petrol and its distribution by means of self-measuring pumps. He said the method of storage in underground tank and supply by self-measuring pump or by gravity from a graduated measuring can seemed to possess several attractive features. In the U.S.A. the self-measuring pump had been almost universally adopted, and many of these were now installed in this country. The graduated measuring tank no doubt had the advantage that the customer had to take nothing on trust, since the graduations on the tank were, or could be, officially guaranteed, and were visible to the eye.

As regarded pumps, the most suitable position was the edge of the kerb. Far from being an obstruction, it actually relieved congestion of traffic, since the time occupied in filling up a car was trifling compared with that spent in first producing and then emptying a succession of two-gallon cans, whilst at the same time the danger of fire was appreciably reduced. But as the law stood at present the local authorities had no power to allow pumps to be erected in this obviously convenient position. Nothing in the nature of even a technical "obstruction" might apparently be located on the public highway, except by virtue of a special Act of Parliament. The self-measuring pump was reliable; the various "stops" determining the quantity were simply and visibly put in operation, and were protected from fraudulent manipulation by seals. It was stated that petrol pumps were in use in Manchester, with much success.

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MOTOR TRAFFIC

WHITSUN HOLIDAY TRAFFIC.

RECORD PATRONAGE OF COACHES AND OMNIBUSES.

Reports from all over the country show that the restriction of the railway services on account of the coal strike resulted at Whitsuntide in record traffic for coaches and omnibuses. During the three days of the holiday hundreds of coaches made the journey from London to the coast resorts of Sussex and Kent. For the second year these vehicles were supplemented by the fine fleet of coaches of the London General Omnibus Company, which ran a number of ninety-mile day trips to places of interest in the Home Counties at the moderate charge of one guinea, which included luncheon and tea at first-class hostelries.

On this occasion there was an extension of London coach traffic to Yarmouth, Lowestoft, and Clacton. Another innovation was co-operation between six London firms (including Messrs. Pickford, T. Tilling, and W. Birch) and the coach owners in Brighton, Eastbourne, Hastings, Bournemouth, Margate, etc., for the purpose of taking passengers to and from London and the seaside. About one thousand vehicles were engaged in the traffic on Whit-Monday, and nearly as many on the preceding Saturday and Sunday. The return journeys to London on the first three days were to a large extent patronised by seaside residents, the passengers from London returning later in the week. The fares were generally higher than are charged at ordinary times.

On Whit-Monday the L.G.O.C. had over 2,700 omnibuses out, including over one thousand of the "K" type. The long-distance journeys on this occasion included a new service to Guildford, a distance of forty miles, the fare for the single journey being three shillings. Hitherto the longest journey on this route has been to Reigate, but the road authorities have at last consented to omnibuses running to Guildford. A number of causes have led to this concession, notably the increased taxation now levied on omnibuses, the higher railway fares, and the fact that the roads have been rendered capable of taking the regular traffic of heavy commercial vehicles, to say nothing of coaches and the local omnibuses which link up all the Surrey districts.

Though the London General Omnibus Company had taken every means of impressing on passengers the need for making return journeys as early as possible, there was a large number who imagined that the last omnibuses at the various points were capable of taking them all. The result was that it was two o'clock on Tuesday morning before the omnibuses reached their garages. The number of passengers carried by the London omnibuses on the various routes on Whit-Monday has been given as approximately 3,000,000, as against more than 2,000,000 transported by the County Council Tramways. Fuel restrictions prevented the tramways giving the fullest possible service; nevertheless the number of passengers was a record for a Bank Holiday.

In the provinces the omnibus undertakings without exception carried record numbers during the holiday, notably at Sheffield, Bristol, Birmingham, and throughout the area of the Lancashire United Tramways. The last three mentioned enterprises had the advantage of fleets of coaches in addition to their omnibuses, the former being used for long distance tours. Nearly 240 omnibuses were run by the Birmingham and Midland Omnibus Company, some going as far as Weston-super-Mare, while to Malvern there was a ten minutes' service over a distance of 37 miles. Mr. O. C. Power, the managing director of this company, states that their services ran into sixteen counties, and on Whit-Monday carried 40,000 persons. According to Mr. Power, people who never travelled by railway on popular holidays are patronising the omnibuses in increasing numbers to explore the country within a few miles of their homes.

Perhaps the record for coach traffic during the holidays was achieved by Blackpool, for on the Saturday, Sunday, and Monday over 300 of the vehicles came into the town each day, to say nothing of many hundred private cars.

At Manchester it was estimated that 100,000 people used the coaches. The trips were to the Lakes, to London, and elsewhere.

EIGHT MILLIONS FROM MOTOR DUTY.—Sir Eric Geddes has written to the Leeds Corporation a letter expressing appreciation of the whole-hearted co-operation of local authorities in collecting the new motor car duties. He says the gross total collected up to May 7 was £8,286,346, and he is assured that to-day there is hardly a vehicle on the road that is not carrying a licence.

U.S.A. MOTOR PRODUCTION.

GIGANTIC OUTPUT FOR 1920.

The National Automobile Chamber of Commerce of the United States has issued its annual return relating to the motor industry. The figures for 1920 eclipse all records, the details being as appended.

U.S.A. 1920 OUTPUT.	
Value of car and lorry output	$2,232,927,678
Value of parts and accessory output	$725,136,942
Value of tire and tube output	$636,750,000
Total	$3,594,514,620
MOTOR VEHICLES PRODUCED	2,205,197
Number of cars	1,883,158
Number of lorries, etc.	322,039
Per cent. gain over 1919	12 per cent.
Per cent exported	7½ per cent.
VEHICLES REGISTERED IN U.S.A.	9,211,295
Percentage gain over 1919	22 per cent.
Number automobiles on farms	3,000,000
Commercial motors registered	900,000
MOTOR VEHICLE MANUFACTURING CONCERNS.	
Capital invested	$1,204,378,642
Wages and Salaries	$482,950,000
Number of employees	325,000
PETROL AND TIRES.	
Petrol produced	4,882,546,699 galls.
Petrol consumed	4,556,428,005 galls.
Tires produced	32,400,000

The value of the total complete cars, commercial vehicles, parts, accessories and tires amounted to over 3½ thousand million dollars. The number of vehicles exported during 1920 was 170,765, as compared with 82,652 in 1919. The majority went to Great Britain, India, Canada, and Cuba. In New York the total registrations of motors for the year were 670,000; in South Dakota there is one motor vehicle for every five persons. A fact of considerable importance to petrol users in Great Britain is that the oil production in the United States exceeded the consumption by 626,118,674 gallons.

The motor industry yields a greater amount in taxation than any other industry, the total levy amounting to $316,720,000. Of this amount over $148,000,000 is in Federal taxes—a sum large enough to pay the Federal judiciary, congressional, and executive expenses, as well as the cost of the Departments of the Interior, Commerce, Treasury, Justice, Labour, and Agriculture, together with the expenses of the Diplomatic and Consular Service.

In commenting on the foregoing returns, the motoring correspondent of the *Daily Telegraph* makes a point that has been urged in these columns, namely, that the Society of Motor Manufacturers and Traders should compile a similar annual report relating to the industry in this country. The Ministry of Transport should shortly be in a position to issue the statistics relating to registrations, but there is at present no means of arriving at the annual production of the various classes of vehicles. The Board of Trade returns would afford information as to exports and imports.

THE ENGINE POWER TAX.

AN ASSERTION AS TO WHY IT WAS ADOPTED.

It will be remembered that after the committee representing makers and users of motor vehicles had reported in favour of raising by means of an engine tax the increased sum required by the Government from motorists, there was an agitation in favour of securing the taxation by a duty on petrol. That course was advocated by the secretary of the Automobile Association in a minority report, and it has lately been asserted by the motoring correspondent of the *Westminster Gazette* that the official referred to was the only protestant "because the Society of Motor Manufacturers and Traders thought that if the tax were put on the engine it would hit the invariably larger engines of American cars much harder than British-made engines. It was done to check more particularly American importations, and with the view to restricting the sale of Ford cars in this country by imposing a tax of £23 on them. Many things have happened to give colour to this suggestion. The Society of Motor Manufacturers did not oppose the engine tax nor did the R.A.C., which has a much closer working arrangement with the society than the A.A. by reason of the fact that the R.A.C. controls all sporting and trials fixtures, which have to be submitted for the approval of the S.M.M.T. before they are adopted. It is significant, to say the least, that the society and the R.A.C. decided to drop their differences, and pull together in this matter. But the mischief is done, and there is no need to say that it has not benefited the British motor trade. I do not know how the engine tax has affected the sale of Ford cars, but we do know that the engine tax has made matters infinitely worse for every manufacturer."

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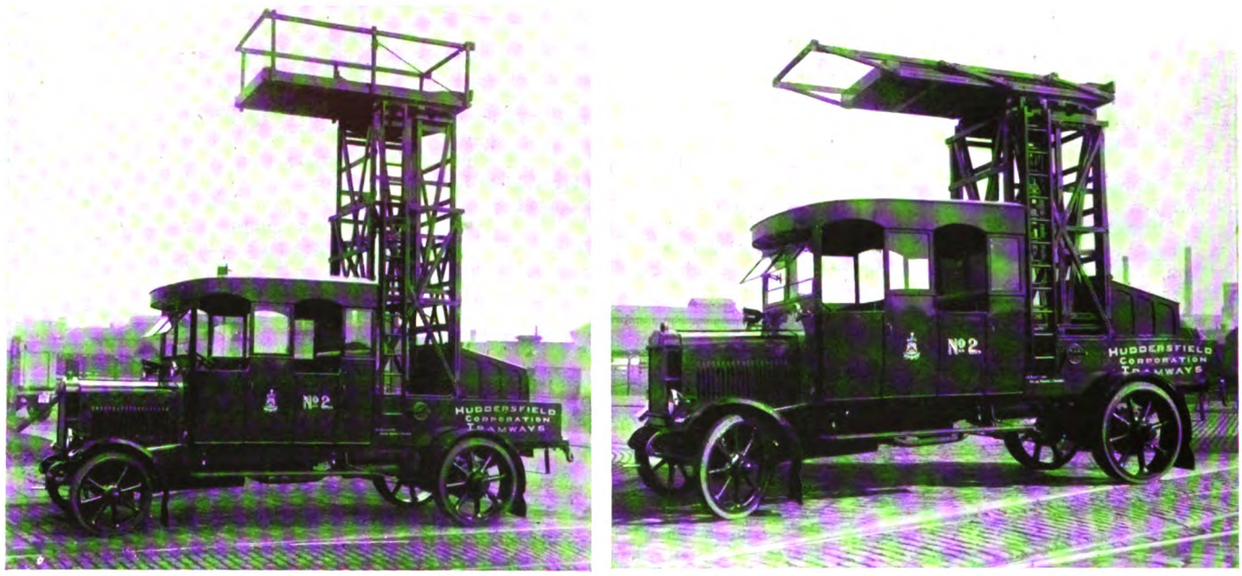
DOUBLE PURPOSE TOWER WAGON.

The photographs on this page illustrate a tower wagon which was constructed to the specification of Mr. A. A. Blackburn, general manager of Huddersfield Corporation Tramways. The chassis, built by Karrier Motors, Ltd., is one of their well-known 3-ton 50 H.P. type.

There are remarkable features associated with the body, which was constructed by the Corporation's own staff. It consists of the usual telescopical tower fitted with revolving top platform with collapsible rails. An unusual aspect of the cab is that it is constructed to carry ten men, besides ample accommodation for all the necessary tools and spares for overhead equipment repairs. Included in the equipment is a complete set of lifting jacks and breakdown apparatus for replacing a derailed tramcar, or for moving any obstruction from the track. Suitable towing hooks are fitted to the chassis for the purpose of hauling clear any obstruction.

In the hilly district round Huddersfield there are many breakdowns of motor traffic, which cause frequent obstructions on the tramway routes, and the tower wagon has been designed and constructed to enable the department to deal with breakdowns of this kind with the least possible delay, and it has been found of valuable assistance. For night operations a C.A.V. lighting set with large accumulator capacity is also provided, and plugs are fitted at various points, including the top of the tower, so that portable lights can be used when required.



Huddersfield Tower Wagon.

THORNYCROFT "COUNTY" MOTOR OMNIBUS.

With a view to bringing their "County" type single-deck omnibus prominently before probable users, Messrs. Thornycroft have produced a well illustrated publication giving a brief specification, together with some particulars which are of considerable interest. Three views of the vehicle are shown, as well as a plan of the seating arrangements. The body has a most pleasing appearance, and is mounted upon the Thornycroft 40-H.P. "J" type chassis. These vehicles are in service in many localities, and the experience gained with them shows that outside of such traffic as is to be found in London the single-deck omnibus is best adapted for the public service. Copies of the booklet will be sent on application to John I. Thornycroft and Company, Limited, 10, Grosvenor Place, S.W.1.

Omnibus Mileage Rates.—Walsall Corporation reports that the Public Works Committee has agreed that the annual mileage payments imposed upon the tramways committee in respect of motor omnibuses be discontinued. The Town Clerk has been instructed to proceed with the application to the Minister of Transport as regards the road authorities which have declined to forego such payments.

OMNIBUSES AND COACHES IN DEMAND.

Useful Services During Tramway Restrictions.

Tramway undertakings in possession of omnibuses have had a considerable advantage during the restrictions imposed on tramway services by the shortage of coal. Services which formerly fed the tramways have been extended to central points, or have been used to augment the reduced tramway facilities on the more important routes. Sheffield, Aberdeen, Edinburgh, and Plymouth were prominent in affording such facilities, while at Bradford, Leicester, Halifax, Blackpool, etc., the owners of coaches found a new use for their vehicles in making good the unavoidable tramway deficiencies. These temporary services were rendered possible by the Watch and Licensing Committees making special arrangements.

At Halifax, however, a dispute arose between the Highways Committee and the Motor Proprietors' Association, in connection with the running of the service of coaches during the Sunday suspension of the tramway service. After a month of operation, the coach owners were called upon to pay a charge of 15s. per vehicle per day, in order to cover the cost of road wear. Another reason advanced for the charge consisted of an allegation that on weekdays some of the coaches had been illegally competing with the tramway service. The owners of the coaches refused to make the payment, and decided to withdraw their vehicles. As the result of negotiations, the Emergency Committee of the Corporation effected an arrangement under which the owners agreed to pay a nominal fee for running on tramway routes when the cars were not in operation.

According to a special correspondent of the *Manchester Guardian*, the experiment of running coaches at Blackpool in place of the suspended Sunday car service has been watched with a good deal of interest by the Corporation, who have been considering for some time the question of running omnibuses in parts of the town not served by tramways. The motor services were run with the sanction of the Corporation, the arrangement being that the receipts should be pooled. There were 46 coaches on the service on Whit-Sunday, and the receipts totalled £436. The charges were about 50 per cent. above the car fares.

East Ham Corporation Works Committee have received quotations for the supply of three electric dust vans from Electricars, Limited; Agricultural and General Engineers (Garrett), Limited; Ransome, Sims and Jefferies, Limited; Electromobile Limited; General Vehicle Company, Limited, and Tilling-Stevens, Limited. The committee deferred consideration of the matter pending an inspection of the various vans.

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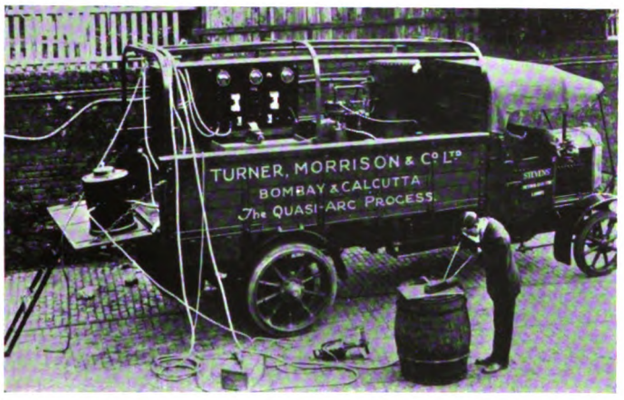
WELDING BY STEVENS CHASSIS.

The illustration shown below is one of two vehicles supplied by Stevens Petrol-Electric Vehicles, Limited, 68 Victoria Street, S.W.1, to the Quasi-Arc Company, Limited, 3 Laurence Pountney Hill, E.C.4, for shipment to India. The chassis is the well-known Stevens petrol-electric 3-ton type, fitted with a W.D. type lorry body.

The stationary vehicle when set to run at 60 volts is capable of supplying current for two type C.R.60 Quasi-Arc welding plants simultaneously on work of a general character. An electric motor installed in the body of the vehicle and working from the dynamo fitted in the chassis drives a vertical cylinder air compressor for pressure at 100 lb. per square inch and a steel receiver of suitable dimensions is fitted in conjunction. The usual pneumatic chipping tools are provided, also a portable electric grinder, the latter also worked by the electrical equipment as fitted to the Stevens chassis. The switchboard contains the necessary instruments for controlling the welding circuit, and cupboards are fitted to accommodate the whole of the loose gear. A work bench is provided and necessary storage receptacles for tools, etc.



Stevens Welding Vehicles for India.

The Stevens chassis is becoming increasingly popular for welding work, and recently a tramways manager of an important municipal undertaking, and a user of several Stevens vehicles, reporting to his committee on track reconstruction, made the following remarks—

> The rails are rather badly worn, but during the last few months I have been experimenting with them by welding up the rail surface at the Dicker joints. This welding has been successful, so much so that I would hesitate to recommend the renewal of these rails at present. I have been able practically to eliminate the joint, and have filled up the worn portion with new metal, deposited by the electric welding plant; the joints being renewed the rails become of considerable value, and I therefore recommend that these rails be bonded.

Mr. E. Manville, M.P., chairman of the Daimler Company, Limited, has agreed to serve on the newly appointed Post Office Council of Business Men.

Mr. C. H. Edwards, of the Lancashire United Tramways, Limited, has been elected a member of the Liverpool, Chester and North Wales Motor Owners' Association.

Mr. C. W. Steventon, who has had wide experience in the tire trade during his service with the Dunlop Company, has been appointed manager of the tire department of Messrs. Pirelli, Limited, at 144, Queen Victoria Street, E.C.

Mr. James McGillivray, who recently resigned his position as sales manager with Messrs. Straker-Squire, has joined the Vulcan Motor and Engineering Company, having charge of the sales department at their London office, 118, Great Portland Street.

Mr. D. McNeil Sharp has been appointed sales manager for Caledon industrial motor vehicles at the company's head office, Duke Street, Glasgow. Mr. Sharp was manager for the Dennis-Portland Company during its short life, but will be best remembered from his connection with Halley's Industrial Motors, Limited, with whom he served for many years.

OMNIBUS SERVICES.

WALSALL.—The tramways manager has been directed to report on the question of erecting a garage for omnibuses at Bloxwich.

DONCASTER.—The Tramways Committee have advised the Corporation to apply for powers to run railless trolley cars and motor omnibuses.

LIVERPOOL.—The Corporation have adopted a recommendation of the Tramways Committee that 20 of their omnibuses be advertised for sale.

LANCHESTER AND SOUTH MOOR.—The North Eastern Railway Company have instituted a motor omnibus service between South Moor and Lanchester.

SUNDERLAND AND SOUTH SHIELDS.—A new omnibus service between Sunderland and South Shields has been opened by the Northern General Transport Company.

EXETER.—The Corporation have sanctioned a new omnibus service between the city and Tiverton, in connection with a Torquay-Exeter Exmouth, Sidmouth, and Crediton service.

MANCHESTER.—Owing to restricted train services, the Watch Committee have granted temporary licences for two motor coaches running between Manchester and Glossop.

CALCUTTA.—The Municipal Council have invited the co-operation of transport companies who are prepared to provide cheap transport facilities in districts not served by the tramways.

PARIS.—According to the Continental *Daily Mail* pneumatic tires are to be tried on the Paris omnibuses, with a view to lengthening the life of the vehicles and the street surfaces.

ROTHERHAM.—A clause in the Corporation Bill authorising the purchase of new omnibuses by the tramways department has been sanctioned by the Local Legislation Committee of the House of Commons.

BELFAST.—By 15 votes to 10 the Corporation have referred back to the Improvements Committee for reconsideration its recommendation that the Tramways Committee should bear the cost of putting in order certain roads over which it is proposed to run omnibuses or the convenience of workers at the shipyards.

LANCASHIRE.—The Highways Committee of the County Council have recommended granting the application of the Ribble Motor Services for permission to run omnibuses over various roads without charge, except on the road between Wheelton and Brinscoll, for which the company will be asked to pay the usual mileage charges.

DURHAM.—Following the rejection by the House of Commons of the County Council's Bill for powers to run omnibuses and to construct tramways, numerous applications have been received for sanction to private proposals for instituting omnibus services. The proposals have been referred to a committee with power to act.

SOUTHEND-ON-SEA.—The Highways Committee of the Corporation have resolved that unless the circumstances are exceptional, no charge will be made for the use of the roads by omnibuses plying for hire in the borough. This decision was taken in consequence of the provisions of the Roads Act, 1920, having fixed the new rates of motor vehicle duty in substitution for all payment in the nature of road charge.

NEWCASTLE-ON-TYNE.—Newburn Urban Council have granted permission to the Corporation to run omnibuses to Ponteland, *via* North Walbottle and High Callerton, a distance of 10 miles from the city. The sanction is dependent on payment of an annual sum equal to 1d. per mile run, and also upon the Newcastle Tramways Committee giving a promise that the service will not substitute the tramway to North Walbottle authorised by the Corporation Act, 1920.

WIGAN.—The Local Legislation Committee of the House of Commons have approved Wigan Corporation Bill, which sought to extend the tramways and to run omnibuses in the areas of surrounding local authorities. The chairmen of twenty of these Councils were in attendance to give evidence in favour of the proposals, but the committee decided to hear only a few of them. Mr. B. Hall, general manager of the tramways, informed the committee that the omnibuses already in service had proved a valuable adjunct to the undertaking. It was proposed to purchase ten more omnibuses.

PORTSMOUTH.—At a meeting of the Corporation on May 24, Councillor Gourd urged that the question of the continuance of the omnibuses ought to receive attention in view of a deficit of

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£3,087 for 1919, and £3,088 for 1920. Up to June, 1920, a sum of £4,173 had been spent on repairing the roads over which they ran. The Mayor, who is chairman of the Tramways Committee, replied that the omnibuses must be accepted as part of the whole service, and the committee had the convenience of the public to consider as well as profit. He believed the type of vehicle was too heavy. It was originally decided to have twenty, but only ten had been accepted. No doubt a different type would be ordered in future. The roads as the tramway management found them were unsuitable for any type of omnibus.

DUNDEE AND PERTH.—The Eastern Scotland Division of the Motor Trade Association have lodged petitions against the applications of Dundee and Perth Corporations for permission to run omnibuses outside their boundaries. The petitioners state that the traders are able to meet any demand for omnibuses outside Dundee and Perth, and that no complaints have been received that inadequate services are being provided, or that the fares are excessive or unreasonable. The proposed services may have the effect of increasing the rates to make up for losses on the services. The payment of the high charges now imposed on public service vehicles under the Finance Act, which go to road maintenance and improvement, could not be justified if the proprietors of such vehicles had to contend with unnecessary, unremunerative, and rate-aided competition.

CARDIFF.—The city is to be linked with Newport by a service of omnibuses belonging to Cardiff Corporation Tramways as soon as Monmouthshire County Council and Newport Corporation have given permission for the use of their roads. The turning point at Newport will be the tramway terminus in Commercial Road. Mr. R. L. Horsfield, the Cardiff general manager, has informed the Tramways Committee that it was highly important the Corporation should exercise their powers of running omnibuses outside the city boundaries. Until the services had been so extended in order to feed the tramways, the former would not prove profitable. At a meeting of Cardiff Tramways Committee on May 20, the chairman referred to the number of applications to the Watch Committee for permission to run coaches and omnibuses from the city to various points, and remarked that a good deal of money was being lost to the Corporation owing to the Finance Committee not assisting the Tramways Committee to develop the running of omnibuses. The licences granted to the various applicants were on condition that the vehicles would only be allowed to run during the restriction of the railway services.

MOTOR VEHICLES FOR MUNICIPALITIES.

ACCRINGTON COUNCIL are purchasing a fire engine.

NEATH RURAL COUNCIL are purchasing a motor lorry.

LETCHWORTH URBAN COUNCIL are obtaining a fire engine.

BOSTON RURAL COUNCIL intend to purchase a steam tractor and two wagons.

MANCHESTER CLEANSING COMMITTEE have decided to purchase a Karrier sweeper and collector.

NORTHUMBERLAND COUNTY COUNCIL have purchased four 3½-ton Albion hydraulic tipping wagons.

WALLSEND COUNCIL have decided to obtain a motor sweeping machine and three tipping wagons.

COLCHESTER COUNCIL are to make a month's trial of collecting refuse by a battery-propelled wagon.

CAMBERWELL BOROUGH COUNCIL have decided to invite quotations for the supply of two motor vehicles.

CHESTER CORPORATION have been granted permission to borrow £1,650 for the purchase of a fire engine.

STOCKTON CORPORATION have been advised by their Omnibus Committee to purchase four new omnibuses.

GAINSBOROUGH URBAN COUNCIL have asked for permission to borrow £1,324, the cost of an electric tipping wagon.

EAST HAM COUNCIL have appointed a committee to consider the question of opening a repair depot for their motor vehicles.

LANCASHIRE COUNTY COUNCIL have acquired two Leyland steam wagons, the Ministry of Transport contributing one-third of the cost.

BRIDLINGTON COUNCIL have authorised the surveyor to make a trial of a demonstration vehicle sent by Sentinel Wagon Company.

BOURNEMOUTH BOROUGH ENGINEER has presented a report dealing with a proposal to use mechanical transport for refuse collection.

GLASGOW CORPORATION WATCH COMMITTEE have authorised the purchase of four motor cycles with side-cars for the use of detective officers.

SOUTH SHIELDS CORPORATION have received sanction to borrow the money required to purchase three electric wagons and two Foden steam vehicles.

BOLTON CORPORATION have requested the cleansing superintendent to report on the advisability of adopting mechanically-propelled vehicles for street cleansing.

THE STANDING JOINT COMMITTEE OF ESSEX COUNTY COUNCIL have decided on the purchase of three motor cars for police purposes at an estimated cost of £810.

LINDSEY (LINCS.) COUNTY COUNCIL have decided to purchase two steam tractors, two 5-ton tipping steam wagons, and ten side-tipping trailers, either new or second-hand.

ADELAIDE ABATTOIR BOARD have ordered nineteen 6-ton chassis from Commercial Cars, Luton. The board have been operating twenty-two 6-ton Commer Car chassis since 1912.

KENSINGTON BOROUGH COUNCIL report that two Ford motor vans purchased a year ago have, compared with horse traction, effected a saving of £800. It is now proposed to purchase a third van.

SHEFFIELD CORPORATION have been recommended to purchase ten 2½-ton electric wagons from the Agricultural and General Engineers, Limited, and for 3½-ton electric vehicles from the General Vehicle Company, Limited.

GREENWICH COUNCIL, following a decision to use motor vehicles in place of horses, have appointed a committee to consider the question of co-ordinating the vehicles and placing the control and maintenance under one committee.

LIVERPOOL.—A recommendation has been made to Liverpool Corporation for the purchase of a Leyland motor chassis of the rebuilt "G" subsidy type (4 tons), including new tires, front and rear mudguards, at a cost of £750.

BATTERSEA BOROUGH COUNCIL WORKS COMMITTEE report that provision is made in the estimates for the purchase of three motor lorries and two motor road sweepers. The committee have recommended the purchase of two Laffly sweepers at 57,600 francs each.

HULL HEALTH COMMITTEE are purchasing an ambulance at a cost of about £750. The Watch Committee have received delivery of a Dennis turbine fire engine with escape and first-aid attachment. Tests carried out with the machine by the brigade have proved satisfactory.

HERTFORDSHIRE HIGHWAYS COMMITTEE report that the Foden steam wagons have done excellent service and the county surveyor recommends the purchase of more of these vehicles. The committee add that by the employment of further Foden wagons a considerable saving can be effected.

CAMBRIDGESHIRE COUNTY COUNCIL have authorised its Mechanical Haulage Committee to purchase various motor vehicles and road plant at an estimated cost of £32,000. Purchases suggested include one Tiger steam tractor, four 3-ton trailers, five 5-ton Foden steam wagons, and four Eagle 4-ton rubber-tired trailers.

SYDNEY (N.S.W.).—There is a proposal before the Sydney (N.S.W.) Municipal Council that two electrically-driven wagons of the city surveyor's department be converted to petrol-driven wagons, at an estimated cost of £1,000, the electrically-driven wagons being now out of commission, due to worn-out batteries.

YORKSHIRE EAST RIDING COUNCIL have been informed by their surveyor that the five steam wagons last year hauled 10,301 tons over 34,957 miles, at a cost of £3,076. The cost includes an allowance for wages of extra loaders and 15 per cent. depreciation. Hired haulage costs about 50 per cent. more than the figures for the Council's own wagons. The surveyor states that another wagon should be purchased.

MANCHESTER.—The Gas Committee have accepted the tender of the Sentinel Wagon Works for the supply of a 3½-ton Sentinel steam wagon. The Cleansing Committee have put forward an estimate totalling £5,800 for the purchase of motor sweeping machines and motor wagons. The committee point out that their policy is to introduce gradually mechanically-propelled sweeping machines and tipping wagons. Experience has shown that this class of plant is more economical than the horse-drawn machines and the estimate is submitted in order to purchase one combined motor sweeper and collector, two motor sweepers and four motor wagons during this financial year.

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MOTOR TRAFFIC NOTES.

TIRE PRICES REDUCED.—Several motor tire companies have announced reductions in the prices of pneumatic and solid tires.

TRANSPORT CONGRESS.—The annual public works, roads and transport exhibition and congress will be held in London from November 17 to 25.

SOUTHWARK COUNCIL'S MOTOR PARADE.—Southwark Borough Council's annual parade of municipal motor and horsed vehicles will take place on June 25.

LOSS OF GOODS TRAFFIC.—It is estimated that during the past two years the railway companies have suffered a loss of six million tons of goods per year from road motor competition.

MANCHESTER-CONGLETON GOODS SERVICE.—Within a few days of the commencement of the coal strike Messrs. Sutton and Company inaugurated a daily motor transport service for goods between Manchester and Congleton, a distance of 26 miles.

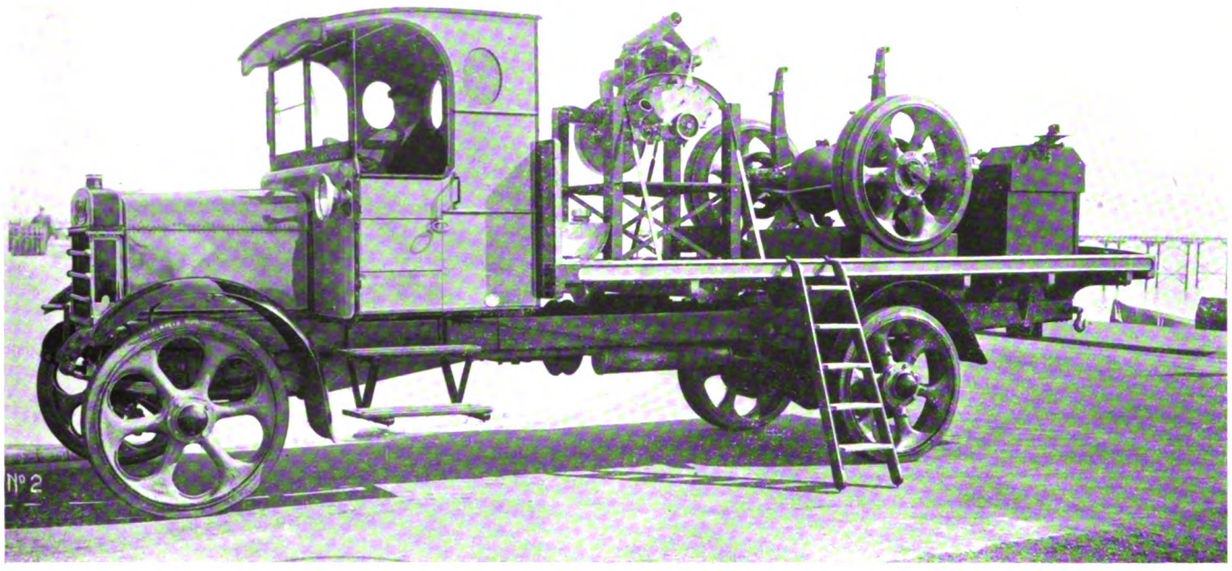
OMNIBUS LEVIES IN ESSEX.—Essex County Council has postponed until its July meeting the consideration of the recommendation of its Highways Committee that the mileage charges in respect of motor omnibuses using new routes be discontinued.

COMMERCIAL TRAVELLERS AND CAR TAXATION.—At the annual conference of the Commercial Travellers' Association, it was unanimously decided to appeal to the Chancellor of the Exchequer for a rebate of 50 per cent. off the ordinary pleasure rates of motor car taxation to commercial travellers using such vehicles for the purpose of their business.

UNION OMNIBUSES FOR FOLKESTONE.—The United Vehicle Workers have formed a company with a capital of £12,000 to run a number of omnibuses to be worked by the late employees of an omnibus company serving Folkestone and district. The men had been on strike during the past ten months. The first vehicle was put in service on May 10.

TRAVELLING VILLAGE LIBRARIES.—At the annual meeting of the Yorkshire Federation of Women's Institutes a resolution was passed asking individual institutes to apply to their respective County Councils to institute a travelling motor library in their areas, thus extending to the villages the advantage of the urban free library. The scheme has been adopted with great success in various counties

COACH AND OMNIBUS GUIDE AND TIME TABLE.—Rieu, Wiley and Company, Pall Mall, S.W.1, are issuing under the title of "Travel by Road" a time table of the motor coach and omnibus services



Components of the Bristol Chassis on a Demonstration Lorry.

THE BURDEN OF THE ROADS.—Reporting on the main roads in the vicinity of Waltham Abbey, the Essex county surveyor says the roads are subject to an ever increasing motor omnibus traffic which will be heavier this year owing to extensions of services.

THE "GREAT" WEST ROAD.—Assent has been given by the Ministry of Transport to a proposal of the Middlesex County Council that the width of the widening of the "Great" West Road should be increased from 80 to 120 feet. The Ministry will contribute £53,250 of the extra cost of £71,000.

COACHES USED DURING A STRIKE.—An excellent service of motor coaches was provided by local proprietors during the greater part of the week during which the employees of the Hastings Tramway Company were on strike in connection with the dismissal of an inspector. The Watch Committee granted special facilities.

ILFORD'S NEW TRANSPORT DEPARTMENT.—The new transport department of the Ilford Urban District Council have arranged for detailed daily reports of work executed by all motor vehicles upon the day following the completion of the work. All transport requirements are to be requisitioned through the foreman in charge.

TRANSPORT FOR SANATORIUM.—In connection with the completion of the Harefield Sanatorium, the Middlesex County Council reports that it will be necessary to provide an ambulance or light car as a means of transport between Denham station and the institution. A sum of £500 has accordingly been included in the estimates.

and through tramway routes in England and Wales. The publication will also include a full index, route maps, and list of fares. About 1,300 omnibus routes will be dealt with, including those to many places not served by railways.

MOTOR TRANSPORT FOR CALCUTTA.—A report of the Calcutta Municipal Council states that in order to facilitate suburban development the provision of cheap transport facilities is essential. In view of the fact that the tramways company does not seem disposed to extend the tramways system under present conditions, the Corporation desires that negotiations be opened with transport companies for the establishment of some other methods of transport.

SUGGESTED TESTS FOR DRIVERS.—In reply to a question at a meeting of the London County Council, the chairman of the Public Control Committee stated that legislation would be necessary in order to insist on a preliminary examination of persons applying for driving licences for motor vehicles. The Council were doing all they could to ensure safety, and recently made representations to the Ministry of Transport for the compulsory use of side-guards on heavy motors.

MOTOR-TRAILER HOLIDAY CARAVAN.—It is hoped shortly to have services of trailer caravans, drawn by a motor vehicle, running between London and Manchester, London and Liverpool, Glasgow and Cornwall. The motor vehicle will have two decks, the top one also being covered, but being collapsible in order to pass under

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railway bridges. Each tractor will draw two trailers, and every vehicle will be fitted with pneumatic tires. It is proposed to cater for holiday traffic.

ROADSIDE PETROL PUMPS.—An experimental petrol pump has been erected in Birmingham. The question of sanctioning others was discussed by the Watch Committee on May 4, when it was stated that there was a demand for such pumps, and if they could be made safe and put in proper places they would be very useful. On behalf of the Fire Brigade Sub-Committee it was observed that they were anxious to meet the desires of motorists, but their first concern was the public safety.

DAY-TO-DAY LICENCES.—The Motor Legislation Committee have asked the Ministry of Transport to consider the advisability of issuing day-to-day licences, as under the existing system of granting annual or quarterly licences motor sales tend to be concentrated within a few very limited periods of the year. Sir E. Geddes has intimated that the proposal to issue licences covering, at proportionate rates, the period to the end of an unexpired quarter commends itself as reasonable.

NEW FEATURE IN LONDON COACH TRAFFIC.—Pickford, Limited, are this summer running evening coach trips in order to cater for London people unable to enjoy a country ride during the day. It is proposed to arrange for dinner at a country hotel before starting on the return run. The firm have this season introduced a vehicle seating 20 persons, in place of 29, and they have decided not to build any more of the large vehicles. Early in May people were stated to be booking seats for day trips in June and July.

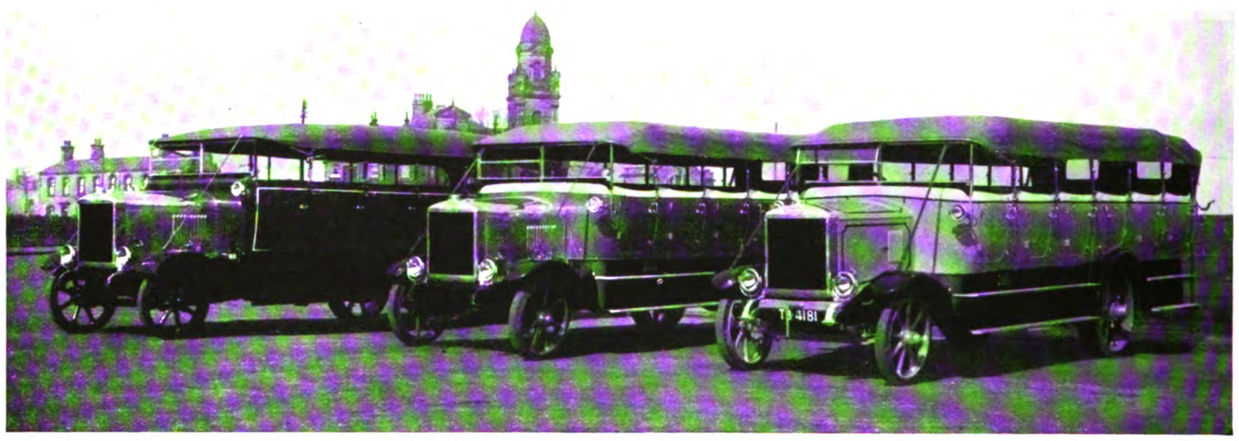
PROBLEM OF THE RURAL TERMINUS.—By a happy thought the driver of a London omnibus running to Caterham was able to circumvent the action of some passengers who refused to alight at the terminus and take places in the queue of persons waiting to return. After the efforts of the company's inspector and of the police had failed to induce the passengers to alight, the driver steered the vehicle on to private ground. Not relishing the prospect of remaining there for an indefinite time, the people alighted and joined the queue.

MOTOR QUESTIONS BEFORE COUNTY COUNCILS' ASSOCIATION.—A resolution from the Essex County Council in favour of requesting the Home Office to take steps to prevent coach passengers becoming a nuisance, was adopted by the County Councils' Association at a meeting of the executive committee on May 25. The West Riding County Council desired that all users of county roads by motor vehicles of over one ton load capacity should be required to fit governors to be effective at 12 miles an hour, but the Highways Committee of the Association were of opinion that the proposal was impracticable. It was decided to refer this question back to the Highways Committee.

MISSING GOVERNMENT LORRIES.—On the day the Government announced that they would insist upon a great reduction in the estimates of the various departments for next year, the auditor-general issued one of the numerous reports which have revealed either great waste or blundering on the part of Government institutions set up during the war. In the latest of these documents there is a reference to the winding up of the Kempton Park motor depot. Pending further explanation by the Ministry of Munitions, the auditor-general states that the number of lorries unaccounted for is about 150. Numerous other incidents are the reverse of pleasant reading for the taxpayers.

NEW ANTI-SPLASH GUARD.—A new design of anti-splash guard which has not yet been represented at any public test has just been introduced. It is known as the "M.R.K.S.," and is handled by Mr. J. L. Leitch, of Belfast. It is in the form of a brush which hangs from the hub of the wheel and has a normal ground clearance of one inch. It can be fitted to any type of wheel—to the hub cap, or by a self-centring bracket covering the hub cap, or in the case of a "dead" axle by drilling and tapping the shafts. Provision is made for lateral, rotational, and vertical movement, so that no obstacle met with on the road has any effect upon its operation. Exhaustive private tests have given much satisfaction.

MUD-SPLASHING TEST AT STOKE-ON-TRENT.—The Ministry of Transport on May 26 informed the Stoke-on-Trent Corporation, in reply to a resolution urging compulsory use of splash-guards on heavy motor vehicles, that no really satisfactory device had yet been brought to notice. The Ministry had had before them the report of the judges on the recent international trials at Camberwell, together with the reports of their technical advisers. Mr. G. Barber challenged the accuracy of the Ministry's statement, and produced a drawing of a contrivance which had been tested recently by the Metropolitan Police. The Council decided that a demonstration of the appliance should take place on a heavy vehicle.



A Group of Karrier Coaches Prepared for Wet Weather.

OMNIBUSES AND ROAD MAINTENANCE.—In presenting the estimates for road maintenance and improvement during the ensuing year, the Highways Committee of Hertfordshire County Council states that "Motor omnibuses are now using roads which have not been used hitherto by this class of traffic. Some of these roads will undoubtedly suffer from the continual running of omnibuses and, where the expenditure in the past has represented ordinary maintenance, the future expenditure will be heavy. It must not be forgotten that at present we only receive 50 per cent. of the expenditure on a first-class road, which in many cases will not cover the actual cost of road improvement due to heavy omnibus traffic."

CANADIAN MOTOR INDUSTRY.—A preliminary report by the Dominion Bureau of Statistics in regard to the automobile industry in Canada in 1919 indicates what great strides the industry has made during the past few years. The report covers the operations of 1,289 plants which are engaged in the manufacture of automobiles, automobile accessories, and automobile repairs. The capital invested in all branches of the industry amounted to 56,943,018 dollars, while the employees numbered 13,084, with salaries and wages totalling 15,389,742 dollars. Car production for the year was as follows—Touring cars, 61,257; runabouts, 3,026; closed cars, 4,125; chassis, 11,528; delivery wagons, 372; trucks, 7,527; and tractors, 2,094; to a total value of 69,656,396 dollars.

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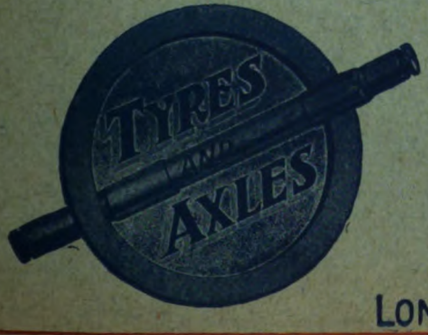

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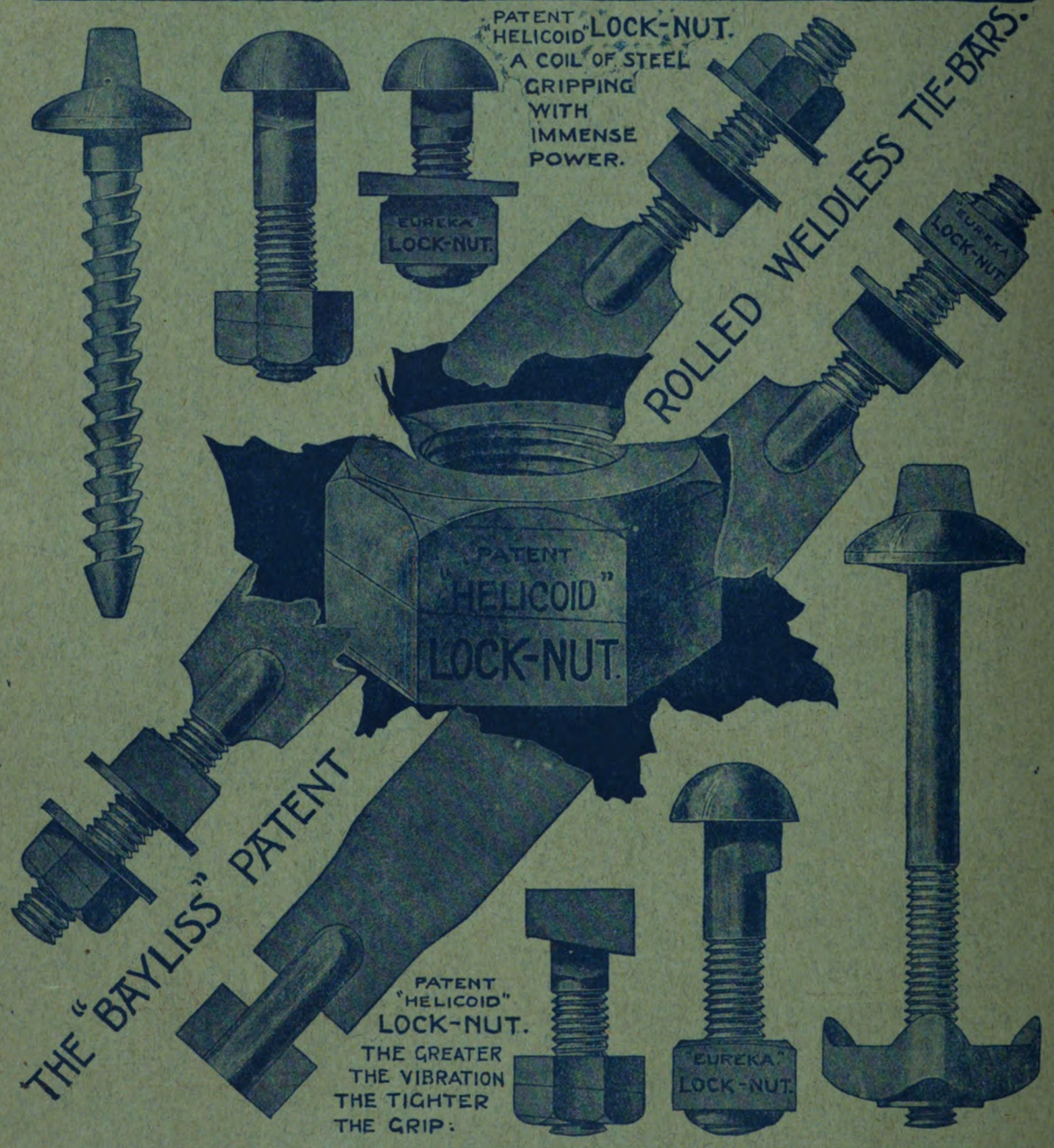
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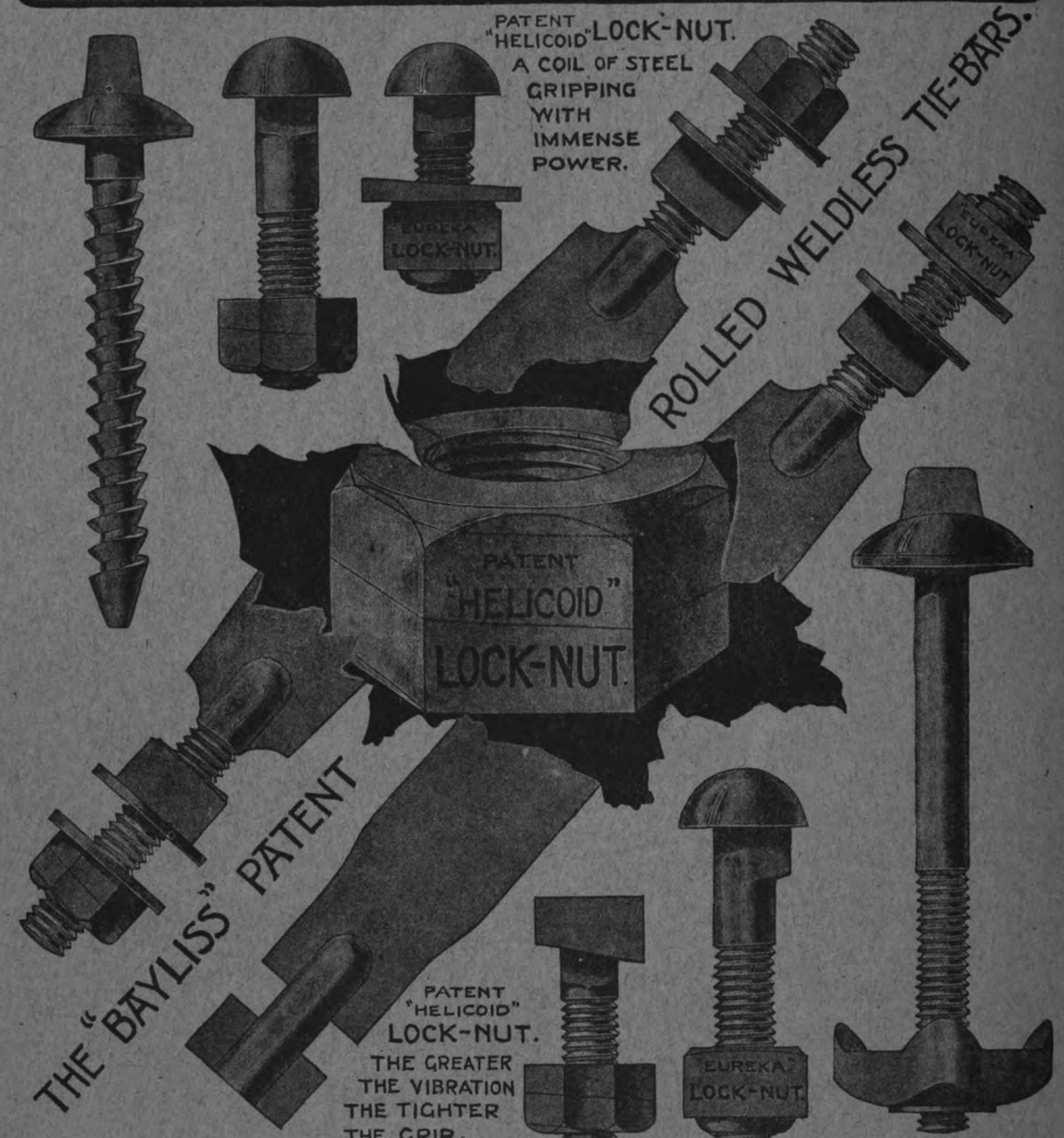
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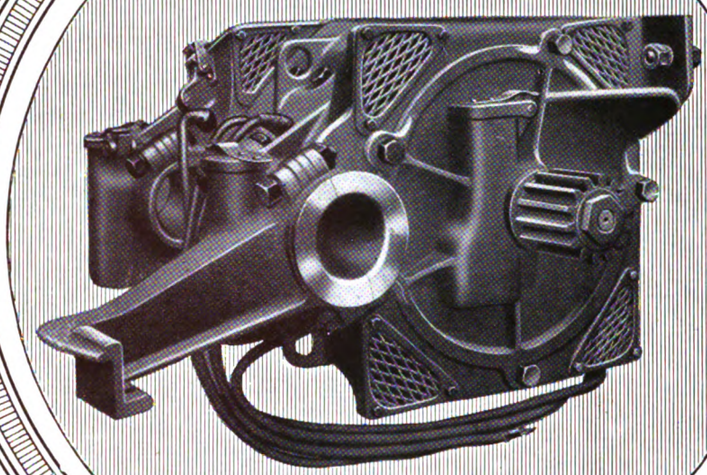

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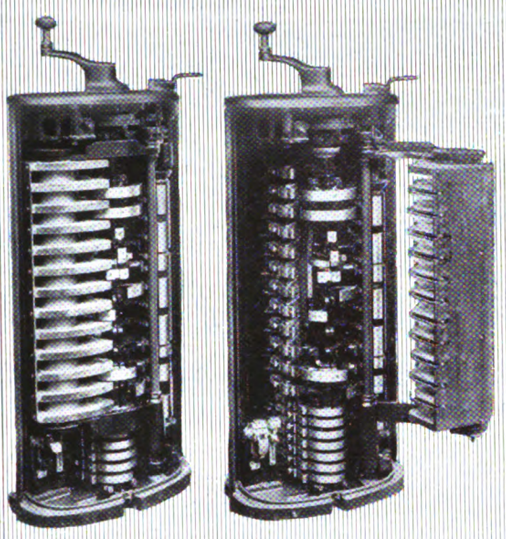

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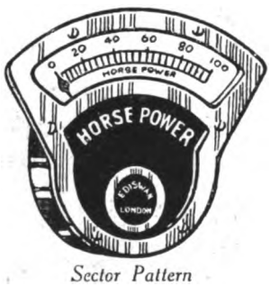

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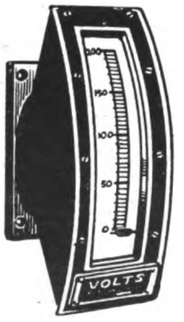

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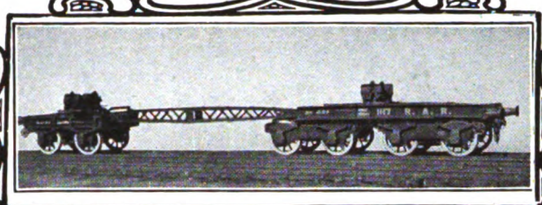

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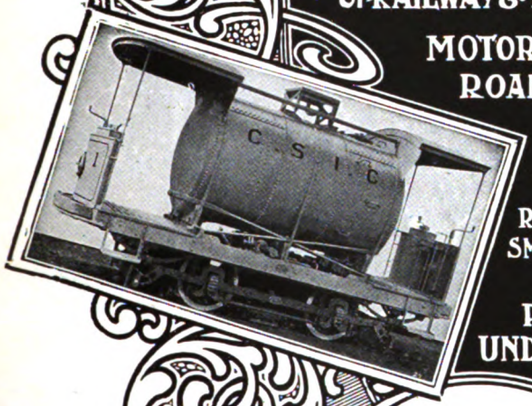

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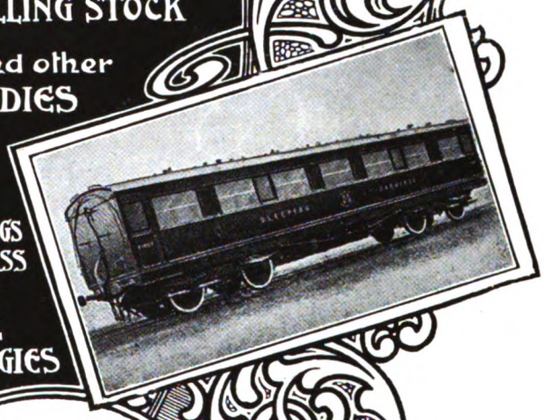

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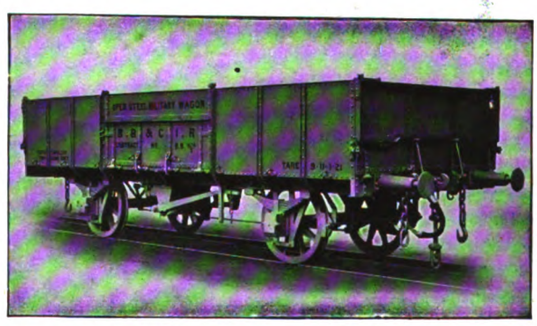

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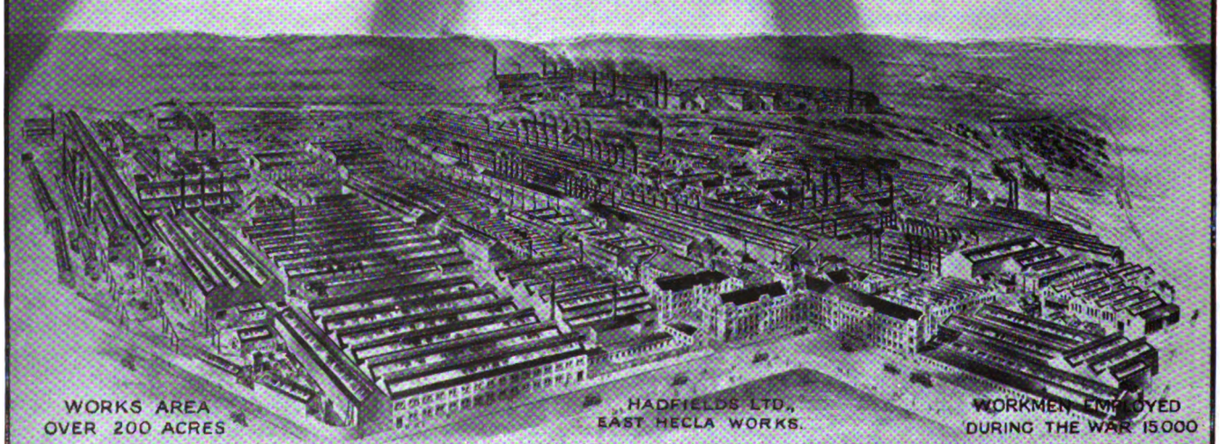

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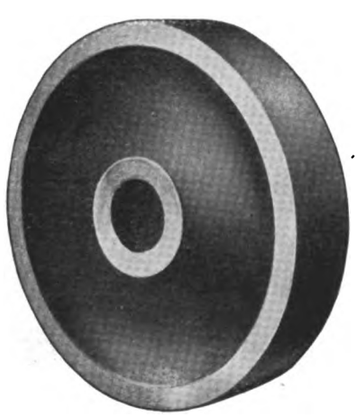

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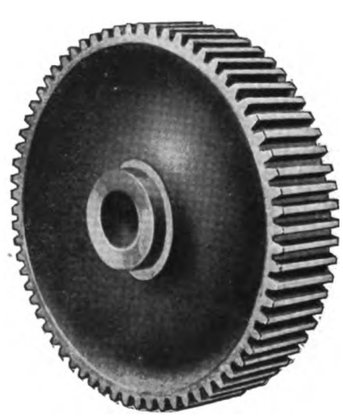

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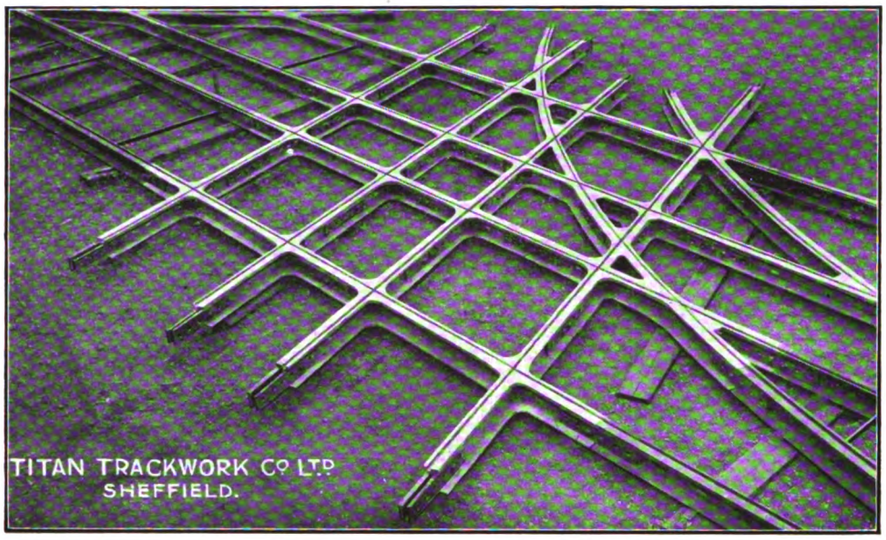

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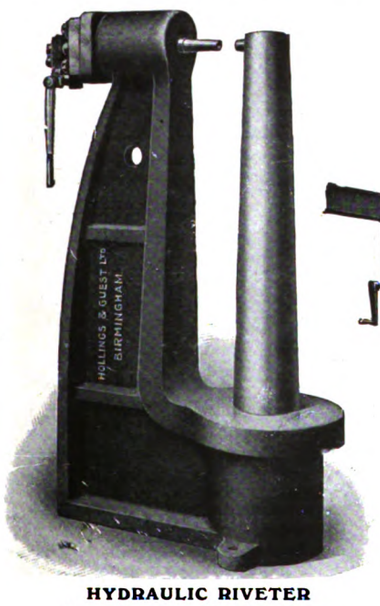

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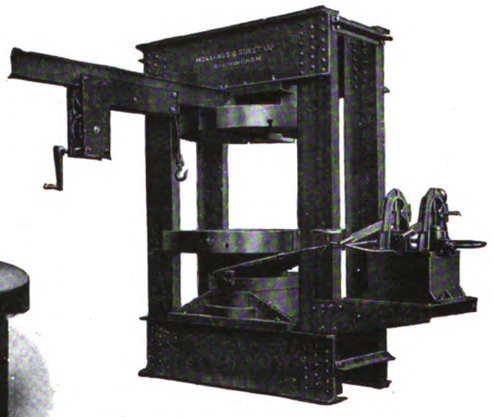

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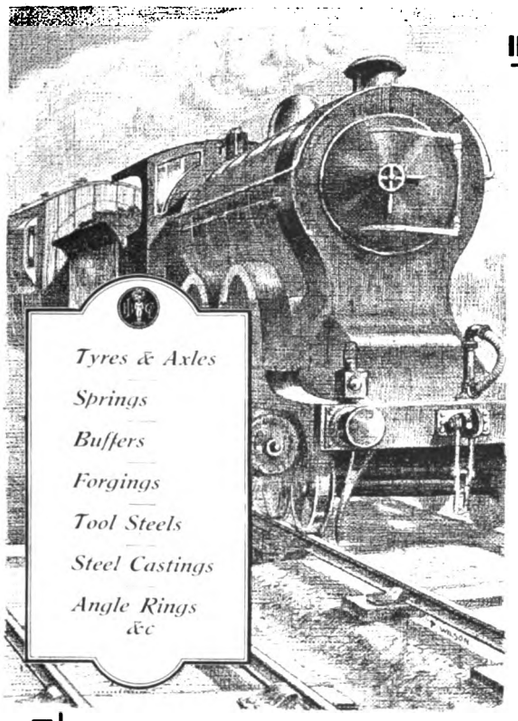

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British Aluminium Co., Ltd., London, E.C.
Henley's Telegraph Works Co., Ltd., London.
Johnson & Phillips, Ltd., Charlton, S.E.
Kalker, E., & Co., Coventry.
Macintosh & Co., Ltd., Chas., London. E.C.

ELECTRIC HEATERS.
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ELECTRIC LAMPS. (See Lamps.)

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Allen, Edgar, & Co., Ltd., Sheffield.
Brill Company, J. G., London, E.C.
British Aluminium Co., Ltd., London, E.C.
British Griffin Chilled Iron & Steel Co.
British Thomson-Houston Co., Ltd., Rugby.
English Electric Co., Ltd., London, W.C.
English Electric & Siemens Supplies, Ltd.
Equipment & Engineering Co., London, W.C.
Fleming, Birkby & Goodall, Ltd., Liversedge.
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General Seating Co., Ltd., London, S.W.
Hadfields, Ltd., Sheffield.
Henley's Telegraph Works Co., Ltd., London.
Metropolitan-Vickers Elec. Co., Manchester.
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Titan Trackwork Co., Ltd., Nottingham.
Tramway Supplies, Ltd., Leeds.
Williams & Pell, London, W.C.
Wiseman, Alfred, Ltd., Birmingham.

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Johnson & Phillips, Ltd., Charlton, S.E.
Tramway Supplies, Ltd., Leeds.

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Anger Manufacturing Co., Ltd., Preston.
Brill Company, J. G., London, E.C.

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Terry & Sons, Ltd., Herbert, Redditch.

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FORGINGS.
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Brill Company, J. G., London, E.C.
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British Thomson-Houston Co., Ltd., Rugby.
English Electric & Siemens Supplies, Ltd.
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Tramway Supplies, Ltd., Leeds.

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Electro-Mechanical Brake Co., W. Bromwich.
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Equipment & Engineering Co., London, W.C.
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Peckham Truck and Eng. Co., London, E.C.
Tramway Supplies, Ltd., Leeds.
Wiseman, Alfred, Ltd., Birmingham.

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Equipment & Engineering Co., London, W.C.
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Tramway Supplies, Ltd., Leeds.
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GRINDING MACHINES (CAR WHEEL).
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GUARD WIRE.
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Tramway Supplies, Ltd., Leeds.

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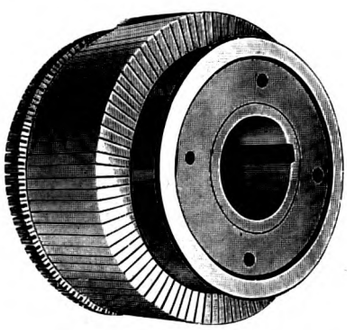

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Kalker, E., & Co., Coventry.

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Equipment & Engineering Co., London, W.C.
Fleming, Birkby & Goodall, Ltd., Liversedge.
Kalker, E., & Co., Coventry.
Tramway Supplies, Ltd., Leeds.
Wiseman, Alfred, Ltd., Birmingham.

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Fleming, Birkby & Goodall, Ltd., Liversedge.
Henley's Telegraph Works Co., Ltd., London.
Metropolitan-Vickers Elec. Co., Manchester.
Tramway Supplies, Ltd., Leeds.
Williams & Pell, London, W.C.
Wiseman, Alfred, Ltd., Birmingham.

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Tramway Supplies, Ltd., Leeds.

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Hadfields, Ltd., Sheffield.

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Rail Welding Co., London, W.
Thermit, Limited, London, E.C.

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Peckham Truck and Eng. Co., London, E.C.

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General Seating Co., Ltd., London, S.W.

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English Electric & Siemens Supplies, Ltd.
Metropolitan-Vickers Elec. Co., Manchester.

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Electro-Mechanical Brake Co., W. Bromwich.
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English Electric & Siemens Supplies, Ltd.
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Allen-Liversidge, Ltd., London, S.W.1.

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Kearsley, Robert, & Co., Ltd., Ripon, Yorks.

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Allen, Edgar, & Co., Ltd., Sheffield.

PISTONS.
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Williamson, Alfred, Ashton-under-Lyne.

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Peckham Truck and Eng. Co., London, E.C.
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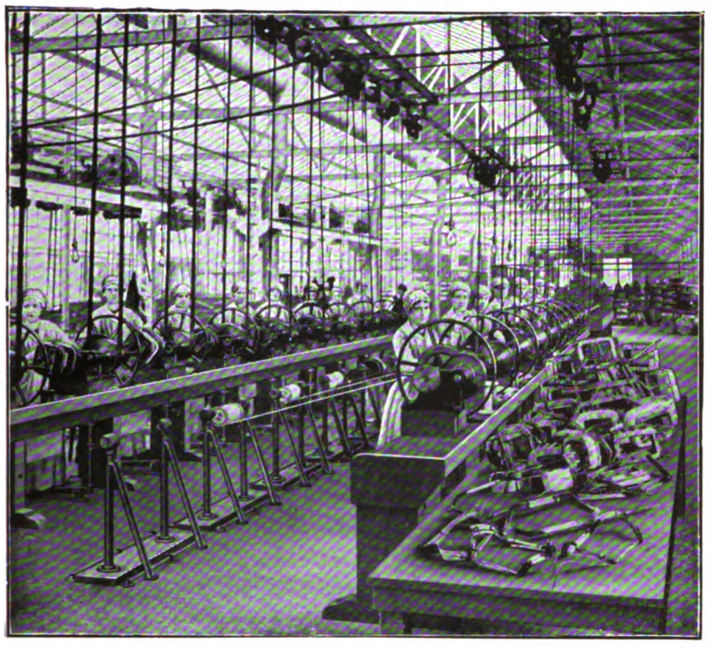

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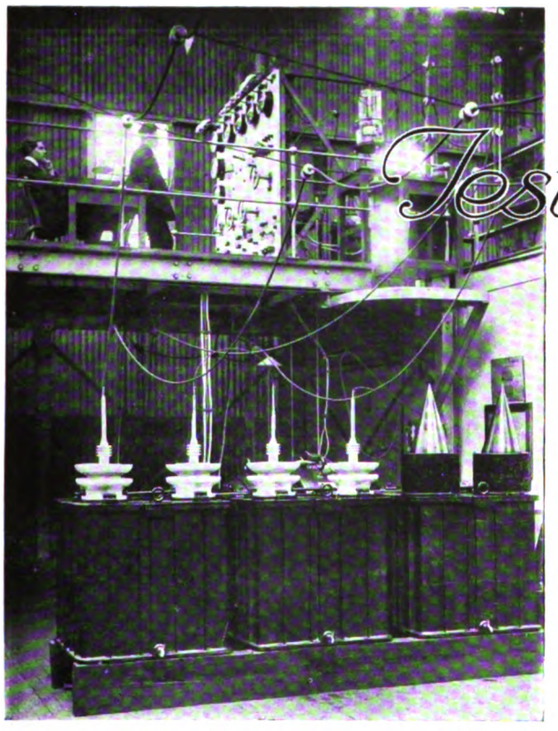

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Hadfields, Ltd., Sheffield.
Lorain Steel Company, London.
Titan Trackwork Co., Ltd., Sheffield.

RAILWAY AND TRAMWAY MOTORS, ELECTRIC.
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British Thomson-Houston Co., Ltd., Rugby.
English Electric Co., Ltd., London, W.C.
Metropolitan-Vickers Elec. Co., Manchester.

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Yates & Co., Ltd., John, Aston Manor.

RATTAN.
Brill Company, J. G., London, E.C.
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RESISTANCES.
Electro-Mechanical Brake Co., W. Bromwich.
English Electric Co., Ltd., London, W.C.

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Empire Roller Bearings Co., London, S.W.

SANDING DEVICES.
Equipment & Engineering Co., London, W.C.
Tramway Supplies, Ltd., Leeds.

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English Electric Co., Ltd., London, W.C.
Equipment & Engineering Co., London, W.C.
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Equipment & Engineering Co., London, W.C.
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General Seating Co., Ltd., London, S.W.

SIDE GUARDS.
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Equipment & Engineering Co., London, W.C.

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Anger Manufacturing Co., Ltd., Preston.
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Hadfields, Ltd., Sheffield.
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English Electric Co., Ltd., London, W.C.
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Brockhouse, J., & Co., Ltd., West Bromwich.
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English Electric Co., Ltd., London, W.C.

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Edison Swan Electric Co., Ltd., Ponders End, Middlesex.
English Electric Co., Ltd., London, W.C.
Johnson & Phillips, Ltd., Charlton, S.E.
Metropolitan-Vickers Elec. Co., Manchester.
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English Electric Co., Ltd., London, W.C.
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Hadfields, Ltd., Sheffield.
Macintosh & Co., Ltd., Chas., London, E.C.

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Equipment & Engineering Co., London, W.C.
Leyland Motors, Ltd., Leyland, Lancs.
Tramway Supplies, Ltd., Leeds.

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Brill Company, J. G., London, S.W.
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English Electric Co., Ltd., London, W.C.
Equipment & Engineering Co., London, W.C.
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Equipment & Engineering Co., London, W.C.
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Equipment & Engineering Co., London, W.C.

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Tramway Supplies, Ltd., Leeds.

TRUCKS, CAR.
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English Electric Co., Ltd., London, W.C.
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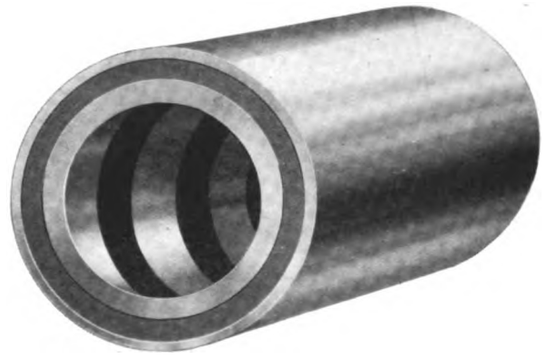

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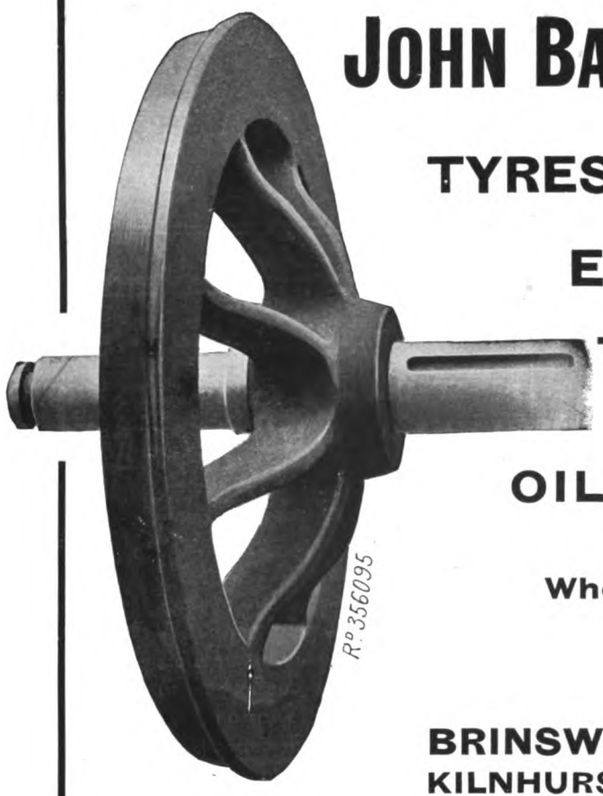

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ALFRED INGRAM & CO.

Queen Annes Chambers
Westminster

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DIRECTORIES OF ELECTRIC TRAMWAYS
IN THE UNITED KINGDOM

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NAMES OF PRINCIPAL OFFICERS
POSTAL ADDRESS, TELEGRAPHIC ADDRESS, AND TELEPHONE NUMBERS

***** In order that these Directories may be kept up to date, it is specially requested that intimation of all changes be sent promptly.**

Aberdare Urban District Tramways, Gadlys Estate, Aberdare. [T.A., Tramways, Aberdare: T.N., 17.] *Gen. Manager and Elec. Engineer*, A. J. Abraham; *Traffic Supt.*, H. King; *Chairman Try. Com.*, Coun. E. Stonelake.

Aberdeen Corporation Tramways, Municipal Buildings, Union Street, Aberdeen. [T.A., Trams, Aberdeen: T.N. 826.] *Gen. Manager and Eng.*, W. Forbes; *Per. Way Eng.*, J. Gordon (*Burgh Surveyor*); *Chairman Try. Com.*, Coun. D. W. Beaton.

Accrington Corporation Tramways, Market Hall, Accrington. [T.A., Trams, Accrington; T.N., 2212.] *Gen. Manager and Eng.*, H. Pilling; *Per. Way Eng.*, W. J. Newton; *Chairman Try. Com.*, Ald. T. E. Higham; *Vice-Chairman*, Coun. F. Lord.

Ashton-under-Lyne Corporation Tramways, Tramway Depot, Mossley Road, Ashton. [T.A., Tramways, Ashton; T.N., 325.] *Gen. Manager*, Ernest Holt; *Elec. Eng.*, N. Appelbee; *Chairman Try. Com.*, Ald. R. S. Oldham; *Vice-Chairman*, Ald. C. H. Waterhouse.

Ayr Corporation Tramways, Town Building, Ayr. [T.A., Trams, Ayr; T.N., 123.] *Gen. Manager and Eng.*, William Grant; *Burgh Elec. Eng.*, R. Marshall; *Per. Way Eng.*, John Young; *Rolling Stock Supt.*, Alf. Somerville; *Convener Try. Com.*, Bailie J. Smith; *Vice-Chairman*, Coun. T. Murray.

Bacup Corporation Tramways.—Town Hall, Bacup, Lancs. [Lines leased to and worked by Rawtenstall Corporation.] *Town Clerk*, J. Entwistle; *Boro' Eng.*, G. Bradley; *Chairman Try. Com.*, Coun. S. McLerie; *Vice-Chairman*, Coun. J. H. Lord.

Barking Town Urban District Tramways, East Street, Barking. [T.N., 156 East Ham.] *Eng. and Manager*, W. Holmes; *Acting Engineer and Manager*, W. E. Kidner; *Chairman Try. Com.*, Coun. A. Whiting.

Barrow Corporation Tramways, Salthouse Road, Barrow-in-Furness. *Manager*, J. R. Groves.

Barton-upon-Irwell District Council Light Railways, Barton-upon-Irwell.
[Line leased to and worked by the Lancashire United Tramways Co., *q.v.*]

Batley Corporation Tramways, Batley, Yorks. *Engineer*, S. D. Jones; *Chairman Try. Com.*, Coun. F. W. H. Auty; *Vice-Chairman*, Coun. J. E. Oldroyd.
[Lines leased to and worked by the Yorkshire (Woollen District) Electric Tramways, Ltd., *q.v.*]

Belfast City Tramways, Tramways Office, Sandy Row, Belfast. [T.A., Tramways, Belfast; T.N., 2444.] *Gen. Manager*, J. S. D. Moffet; *Traffic Manager*, R. McMaster; *City Elec. Eng.*, T. W. Bloxam; *Per. Way Eng.*, E. S. Pinkerton; *Chief Eng.*, H. Vernon; *Chairman Try. Com.*, Coun. W. C. Turner; *Vice-Chairman*, D. Anderson

Bexley Urban District Council Tramways and Dartford Light Railways. Broadway, Bexleyheath, Kent. [T.A., Makin, Tramways, Bexley; T.N., 79.] *Gen. Manager and Elec. Eng.*, J. Makin; *Chairman Try. Com.*, Coun. W. H. Monk.

Birkenhead Corporation Tramways, Laird Street, Birkenhead. [T.A., Tramways Manager, Birkenhead; T.N., 1110.] *Gen. Manager*, C. Clarke; *Borough Sur. and Eng.*, C. Brownridge; *Rolling Stock Supt.*, R. Chadwick; *Chairman Try. Com.*, Coun. H. Halsall; *Vice-Chairman*, Ald. S. Vaughan.

Birmingham Corporation Tramways, The Council House, Congreve Street, Birmingham. [T.A., Trams, Birmingham; T.N., Central 7,000.] *Gen. Manager*, A. Baker; *Elec. Engineer*, A. C. Baker; *Traffic Supt.*, J. McDonnell; *Per. Way Eng.*, C. E. S. Bill; *Chief Engineer*, R. H. Dickinson; *Car Works Supt.*, T. C. Winfield; *Chairman Try. Com.*, Coun. W. E. Lee.

Blackburn Corporation Tramways, Tramways Office, Blackburn. [T.A., Tramways, Blackburn; T.N., 4321.] *General Manager*, J. H. Cowell; *Elec. Eng.*, P. P. Wheelwright; *Traffic Manager*, R. Riley; *Car Shed Supt.*, H. W. Seymour; *Chairman Try. Com.*, Coun. C. Higham; *Vice-Chairman*, Ald. W. Thompson.

Blackpool Corporation Tramways, West Caroline Street, Blackpool. [T.N., 67.] *Gen. Manager*, C. Furness; *Traffic Supt.*, C. I. Baker; *Resident Eng.*, F. Field; *Chairman Try. Com.*, Coun. H. Brooks; *Vice-Chairman*, Coun. T. G. Lumb.

Bolton Corporation Tramways, Bradshawgate, Bolton. [T.A., Manager, Tramways, Bolton; T.N., 490.] *General Manager*, J. Barnard; *Elec. Eng.*, W. J. H. Wood; *Per. Way Eng.*, E. Ll. Morgan; *Rolling Stock Supt.*, C. Beech; *Chairman Try. Com.*, Coun. J. R. Horrocks; *Vice-Chairman*, Coun. P. Higson.

Bootle Corporation Tramways, Electricity Works, Pine Grove, Bootle. [T.N., 424.] *Elec. Eng.*, T. D. Clothier; *Chairman Try. Com.* Ald. Booth; *Vice-Chairman*, Coun. Ashton.
[Lines worked by Liverpool Corporation Tramways.]

Bournemouth Corporation Tramways, Tramways Offices, Lansdowne Crescent, Bournemouth [T.A., Tramways, Bournemouth; T.N., 1701.] *General Manager*, I. Bulfin; *Chief Assistant & Elec. Eng.*, H. Vickers; *Traffic Supt.*, G. F. Glass; *Chairman Try. Com.*, Coun. J. Wilson; *Vice-Chairman*, Coun. W. H. Ridout.

Bradford Corporation Tramways, Central Office, 7, Hall Ings, Bradford. [T.A., Tramways, Bradford; T.N., 2381 and 2382.] *Gen. Manager*, R. H. Wilkinson; *Asst. Elec. Eng.*, Johnstone Wright; *Traffic Supt.*, T. Stirk; *City Elec. Eng.*, T. Roles: *Chairman Try. Com.*, Ald. Enoch Priestley; *Vice-Chairman*, Coun. I. F. Akeroyd.

Brighton Corporation Tramways, Lewes Road, Brighton. [T.A., Tramways, Brighton; T.N., 353 P.O.] *Eng. & Manager*, William Marsh; *Traffic Supt.*, W. N. Brooks; *Rolling Stock Supt.*, W. Orchard; *Per. Way Eng.*, F. N. Hudson; *Chairman Try. Com.*, Ald. J. Lintott.

Burnley Corporation Tramways, Queen's Gate, Burnley. [T.N., 46.] *Gen. Manager*, Henry Mozley; *Boro. Elec. Eng.*, J. E. Starkie; *Boro. Surveyor*, G. H. Pickles; *Chairman Try. Com.*, Coun. E. Heap; *Vice-Chairman*, Coun. D. D. Irving.

Burton-on-Trent Corporation Tramways, Guild Street, Burton-on-Trent. [T.N., 202.] *Manager*, A. B. Slater; *Engineer*, T. Hall; *Chairman Try. Com.*, Ald. J. S. Rowland; *Vice-Chairman*, Ald. T. E. Lowe.

Bury Corporation Tramways, Market Place, Bury. [T.N., 26.] *Gen. Manager*, Frank Buckley; *Boro. Elec. Eng.*, S. J. Watson; *Chairman Try. Com.*, Ald. T. S. Collinge, J.P.; *Vice-Chairman*, Coun. H. Hargreaves.

Cardiff Corporation Tramways, Central Offices, The Hayes, Cardiff. T.N., 1211, 1240, 1350, and 377.] *Gen. Manager*, R. L. Horsfield; *Elec. Eng.*, C. G. M. New; *Traffic Manager*, H. David; *Rolling Stock Supt.*, Jas. Preston; permanent way under supervision of *City Engineer*, E. J. Elford; *Chairman Try. Com.*, Coun. S. Jenkin; *Vice-Chairman*, Ald. R. J. Smith.

Chester Corporation Tramways, Station Road, Chester. [T.N., 166.] *Manager*, W. H. Ellis; *Elec. Eng.*, S. E. Britton; *Per. Way Eng.*, W. M. Jones; *Chairman Try. Com.*, Ald. J. Jones; *Vice-Chairman*, Coun. A. S. Dutton.

Chesterfield Corporation Tramways, Chatsworth Road, Chesterfield. [T.A., Tramways, Chesterfield; T.N., 78.] *Gen. Manager*, R. H. Campion; *Assist. Gen. Manager*, W. A. Toppin; *Chairman Try. Com.*, Coun. P. M. Robinson; *Vice-Chairman*, Ald. Sir E. Shentall.

Colchester Corporation Tramways, Magdalen Street, Colchester. [T.A., Tramways, Colchester; T.N., 92.] *Gen. Manager and Engineer*, R. C. Bullough; *Chairman Try. Com.*, Coun. G. F. Wright; *Vice-Chairman*, Coun. W. Chopping.

Colne Corporation Tramways, Colne, Lancashire. *General Manager and Engineer*, J. Thompson *Chairman Try. Com.*, Coun. J. Thompson.

Coventry Corporation Tramways, Priestley's Bridge, Coventry. [T.A., Tramways, Coventry; T.N., 1014.] *Engineer and General Manager*, T. R. Whitehead; *Assistant Engineer*, W. M. Milnes; *Chairman*, Coun. French; *Vice-Chairman*, Coun. Bates.

Croydon Corporation Tramways, Tramways Office, Thornton Heath, Surrey. [T.A., Tramways, Croydon; T.N., 406, Croydon.] *Tramways Manager*, T. B. Goodyer; *Chairman Try. Com.*, Coun. A. A. Thomson; *Vice-Chairman*, Ald. G. J. Allen, J.P.

Darlington Corporation Tramways, Haughton Road, Darlington. [T.A., Tramways, Darlington; T.N., 2435.] *General Manager and Elec. Eng.*, J. R. P. Lunn; *Traffic Supt.*, J. Fraser; *Chairman Try. Com.*, Ald. Sir C. Starmer.

Dartford Urban District Council Light Railways, Dartford. *Chairman Try. Com.*, Coun. R. Penney; *Vice-Chairman*, Coun. W. J. Bourne.
[Lines worked by Bexley U.D. Council, *q.v.*]

Darwen Corporation Tramways, Lorne Street, Darwen. [T.N., 104.] *Gen. Manager and Eng.*, G. A. Newsome; *Boro. Elec. Eng.*, F. M. Fletcher; *Chairman Try. Com.*, Coun. Geo. Pickup; *Vice-Chairman*, Coun. G. Butterworth.

Derby Corporation Tramways, 4, Victoria Street, Derby. [T.N., 410.] *Gen. Manager*, F. Harding; *Elec. Eng.*, T. P. Wilmshurst; *Per. Way Eng.*, J. Ward; *Chairman Try. Com.*, Coun. W. Eaton, J.P.

Doncaster Corporation Tramways, Grey Friar's Road, Doncaster. [T.A., Rayner, Doncaster, T.N., 43.] *Manager*, T. Potts; *Elec. Eng.*, S. R. Windle; *Chairman Try. Com.*, Ald. S. Balmforth.

Dover Corporation Tramways, Town Hall, Dover. [T.A., Trams, Dover; T.N., 294.] *Gen. Manager*, E. H. Bond; *Per. Way Eng.*, Wm. Boulton Smith (Boro. Surveyor); *Chairman Try. Com.*, Coun. Barwick; *Vice-Chairman*, Coun. Thomas.

Dundee Corporation Tramways, Town House Buildings. Dundee. [T.N., 1340]; *Gen. Manager and Eng.*, W. T. Young; *Elec. Eng.*, H. Richardson; *City Eng.*, J. Thomson; *Chairman Try. Com.*, Coun. A. Malcolm.

East Ham Corporation Tramways, Nelson Street, East Ham. [T.N., 511 and 100 East Ham.] *Gen. Manager and Elec. Eng.*, W. C. Ullmann; *Chairman Try. Com.*, Ald. Oakes, J.P.; *Vice-Chairman*, Coun. Newling.

Eccles Corporation Tramways, Eccles. *Elec. Eng.*, H. W. Angus; *Per. Way Eng.*, T. S. Picton; *Chairman Try. Com.*, Coun. Alexander; *Vice-Chairman*, Ald. Pearson. [Lines worked by Salford Corporation.]

Edinburgh Corporation Tramways, 2, St. James' Square, Edinburgh. *Gen. Manager*, R. S. Pilcher; *Traffic Supt.*, R. McLeod; *Burgh Engineer*, A. H. Campbell; *Chairman Try. Com.*, Coun. W. R. Sleigh.
[The entire system of the Edinburgh tramways is at present worked by cable traction, with the exception of 1½ miles of electric lines. The Council has decided to electrify the whole of the system, and the work has been commenced.]

Erith Urban District Council Tramways, Tramway Depôt, Walnut Tree Road, Erith. [T.A., Tramways, Erith; T.N., 36.] *Gen. Manager and Elec. Engineer*, J. C. Williams; *Chairman Try. Com.*, Coun. W. F. B. Howell.

Exeter Corporation Tramways, Heavitree Road, Exeter. *Gen. Manager*, R. O. Baldwin; *Elec. Eng.* H. D. Munro; *Per. Way Eng.*, T. Moulding; *Chairman Try Com.*, Coun. F. G. Towill; *Vice-Chairman*, Coun. F. Chick.

Farnworth Urban District Council Tramways, Albert Road, Farnworth. *Chairman Try. Com.*, Coun. Barnes; *Vice-Chairman*, Coun. R. H. Cunliffe, J.P.
[Lines leased to the South Lancashire Trys. Co.]

Glasgow Corporation Tramways, 46, Bath Street, Glasgow. [T.A., Trams, Glasgow; T.N., 1040, Douglas.] *Gen. Manager*, J. Dalrymple; *Deputy Gen. Manager*, L. Mackinnon; *Chief Eng.*, J. Ferguson; *Elec. Eng.*, ———— *Sec. and Treasurer*, J. N. Wilson; *Chairman Try. Com.*, Bailie M'Whirr; *Vice-Chairman*. Bailie Laing.

Gloucester Corporation Light Railway, Bristol Road Depôt, Gloucester. [T.A., Tramways, Gloucester; T.N. 155.] *Gen. Manager and Elec. Eng.*, F. H. Corson; *Chairman Try. Com.*, Coun. J. O. Roberts (Mayor); *Vice-Chairman*, Coun. W. Colwell.

Great Yarmouth Corporation Tramways, Caister Road, Great Yarmouth. [T.N. 265.] *Gen. Manager*, F. L. Turner; *Elec. Eng.*, Gordon Bryant; *Per. Way. Eng.*, J. W. Cockrill (Borough Surveyor); *Chairman Try. Com.*, Ald. D. McCowan.

Halifax Corporation Tramways, Skircoat Road, Halifax. [T.N., 36 and 382.] *General Manager*, B. Hall; *Try. Eng.*, J. W. Galloway; *Per. Way Eng.*, J. Lord (Boro. Eng.); *Chairman Try. Com.*, Ald. C. F. Spencer; *Vice-Chairman*, Ald. A Broadley.

Haslingden Corporation Tramways, John Street, Haslingden. *Gen. Manager, Elec. Eng., and Per. Way Eng.*, Barnes Kay; *Chairman Try. Com.*, Coun. Haworth; *Vice-Chairman*, Ald. Russell.

Herne Bay Pier Tramway (owned and worked by Herne Bay U.D.C.), Herne Bay. [T.N., 22.] *Res. Manager*, P. W. Carey.

Heywood Corporation Tramways, Heywood, Lancs. [T.N., 47.] *Gen. Manager*, D. H. Davies; *Per. Way Eng.*, J. B. Nuttall; *Chairman Try. Com.*, Ald. J. Ashworth, J.P.; *Vice-Chairman*, Ald. T. Popple, J.P.

Huddersfield Corporation Tramways, John William Street, Huddersfield. [T.N., 698 and 398.] *Gen. Manager and Eng.*, A. A. Blackburn; *Track Eng.*, K. F. Campbell (Borough Eng.); *Elec. Eng.*, J. W. Turner; *Traffic Supt.*, T. Hartley; *Chairman Try. Com.*, Coun. E. H. Sellers; *Vice-Chairman*, Coun. T. Canby.

Hull Corporation Tramways, Alfred Gelder Street, Hull. [T.N., 444, Corporation] *Manager*, E. S. Rayner; *Traffic Supt.*, C. F. Ellwood; *Engineer*, F. W. Bricknell (City Engineer) [T.N., 943, Corporation]; *Chairman Try. Com.*, Coun. A. D. Willoughby; *Vice-Chairman*, Coun. C. P. Sherwood.

Ilford Urban District Council Tramways, Ley Street, Ilford. [T.N., 684.] *Manager and Engineer*, L. E. Harvey; *Chairman Try. Com.*, Coun. G. R. Davey; *Vice-Chairman*, Coun. H. L. Crofts.

Ipswich Corporation Tramways, Constantine Road, Ipswich. [T.A., Ayton, Tramways, Ipswich; T.N., 354.] *Gen. Manager and Elec. Eng.*, Frank Ayton; *Traffic Supt.*, A. Butler; *Rolling Stock Supt.*, W. A. Fairhead; *Chairman Try. Com.*, Coun. E. C. Ransome (Mayor); *Vice-Chairman*, Coun. W. P. Burton.

Kearsley Urban District Council Tramways, Council Office. Kearsley, Farnworth, S.O. *Clerk U. D. C.*, H. Martin.
[Lines leased to and worked by the South Lancashire Tramways Co.]

Keighley Corporation Tramways, South Street, Keighley. [T.A., Tramways, Keighley; T.N., 263.], *Gen. Manager and Tramways Engineer*, J. A. Bromley; *Boro. Elec. Eng.*, H. Webber; *Chairman Try. Com.*, Coun. J. Crabtree.

Kilmarnock Corporation Tramways Electricity Works, Kilmarnock. [T.N., 95.] *Elec. Eng. and Manager*, J. H. Menzies; *Consulting Engineers*, Kennedy and Jenkin; *Convener Try. Com.*, Coun. Dunlop.

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ELECTRIC TRAMWAYS IN THE UNITED KINGDOM

Kirkcaldy Corporation Tramways, Electricity Works Victoria Road, Kirkcaldy. [T.A., Tramways, Kirkcaldy. T.N., 124, 174, and 175.] *Manager & Elec. Eng.*, O. F. Francis; *Traffic Manager*, Jas. Fisher; *Chairman Try. Com.*, Coun. G. Fergusson.

Lancaster Corporation Tramways, Electricity Works, Lancaster. [T.A., Milnes, Tramways, Lancaster; T.N., 1, L.] *Gen. Manager & Elec. Eng.*, G. C. Milnes; *Acting Boro. Electrical Engineer and Tramways Manager*, J. B. Patterson; *Traffic Manager*, W. T. Charlton; *Chairman Try. Com.*, Coun. I. J. Curwen, (Mayor).

Leeds City Tramways, Swinegate, Leeds. [T.A., Tramways, Leeds; T.N., 21601; *General Manager*, J. B. Hamilton; *Traffic Supt.*, A. Daggett; *Elec. Eng.*, John Burbridge; *Highways and Per. Way Eng.*, E. W. Cockerlyne; *Car Works Supt.*, G. E. Watmough; *Chairman Try. Com.*, Ald. R. A. Smithson; *Vice-Chairman*, Ald. H. Brown.

Leicester Corporation Tramways, 20 and 22, Humberstone Gate, Leicester. [T.N., 2177.] *Manager & Sec.*, A. F. Lucas; *Boro. & Try. Eng.*, E. G. Mawbey; *Boro. Elec. Eng.*, T. R. Smith; *Cons. Engs.*, Kincaid, Waller & Manville; *Chairman Try. Com.*, Ald. S. Flint, J.P.; *Vice-Chairman*, Ald. G. Banton, J.P.

Leith Corporation Tramways, 165, Leith Walk, Leith. [T.N., 415.] *Gen. Manager*, F. A. Fitzpayne; *Per. Way Eng.*, J. R. Findlay (*Burgh Eng.*); *Chairman Try. Com.*, Bailie Goalen.

Leyton District Council Tramways, Car Depot, Lea Bridge Road, Leyton, E. [T.A., Tramways, Leyton; T.N., 17 Walthamstow.] *Manager*, F. Schofield; *Elec. Eng.*, F. Harman Lewis; *Per. Way Eng.*, E. H. Essex; *Chairman Try. Com.*, Coun. C. W. Daines.

Lincoln Corporation Tramways, Brayford Side North, Lincoln. [T.A., Clegg 109 Lincoln; T.N., 109]. *General Manager and Elec. Eng.*, Stanley Clegg; *Traffic Manager*, R. Hoggard; *Chairman Try. Com.*, Ald. W. S. White.

Liverpool Corporation Tramways, 24, Hatton Garden, Liverpool. [T.A., Tramways, Liverpool; T.N., 2580 and 3880, Central.] *General Manager*, P. Priestly; *Per. Way Eng.*, J. A. Brodie (*City Engineer*); *Rolling Stock Supt.*, T. Ridyard; *Chairman Try. Com.*, Coun. F. C. Wilson; *Vice-Chairman*, Ald. F. Smith, J.P.

London County Council Tramways, 23, Belvedere Road, Lambeth, London, S.E.1. [T.A., Lotram, Watloo, London; T.N., 3150 Hop] *General Manager*, A. L. C. Fell; *Traffic Manager*, J. K. Bruce; *Electrical Engineer*, P. L. Riviere; *Rolling Stock Eng.*, W. E. Ireland; *Per. Way Eng.*, J. Welling; *Chairman Highways Com.*, W. J. Squires; *Vice-Chairman*, Lieut.-Comm. A. Cooper Rawson.

Lowestoft Corporation Tramways, Norwich Road, Lowestoft. [T.N., 87.] *Gen. Manager*, H. H. Saunders; *Elec. Eng.*, W. R. May; *Chairman Try. Com.*, Coun. F. Spashett.

Maidstone Corporation Tramways, Tramway Offices, Tonbridge Road, Maidstone. [T.A., Lambert, Tramways, Maidstone; T.N., 448] *Gen. Manager and Elec. Eng.*, A. T. Lambert; *Chairman Try. Com.*, Ald. D. T. J. Lyle; *Vice-Chairman*, Coun. Armstrong.

Manchester Corporation Tramways, 55, Piccadilly, Manchester. [T.A., Tramways, Manchester; T.N., 7800 City.] *Gen. Manager*, J. M. McElroy; *Asst. Manager*, James Wood; *Traffic Sup.*, J. T. Oakes; *Elec. Eng.*, J. J. McMahon; *Chief Civil Eng.*, H. Mattinson; *Rolling Stock Supt.*, G. R. Blackburn; *Chairman Try. Com.*, Ald. J. Bowes; *Vice-Chairman*, Ald. A. W. Chapman.

Middlesbrough Corporation Tramways, Middlesbrough. *Gen. Manager*, H. G. Jeken; *Chairman, Try. Com.*, Coun. E. Turner; *Vice-Chairman*, Ald. J. Calvert.

Middlesex County Council Light Railways, Middlesex Guildhall, Westminster, London, S.W. *County Eng.*, H. T. Wakelam, M.I.C.E.; *Chairman of Light Railways Com.*, County Ald. H. Burt; *Vice-Chairman*, County Ald. F. Goodyear.

Nelson Corporation Light Railways, Charles Street, Nelson. [T.N., 115.] *Manager and Elec. Eng.*, G. F. Nayler; *Per. Way Eng.*, W. Shackleton; *Chairman Try. Com.*, Ald. W. F. Cooke.

Newcastle-upon-Tyne Corporation Tramways, Manors, Newcastle. [T.A., Traction, Newcastle; T.N., 913 and 914 Central.] *Gen. Manager & Engineer*, Ernest Hatton; *Traffic Supt.*, T. Chalder; *Per. Way Eng.*, W. J. Steele; *Chairman Try. Com.*, Ald. R. Mayne; *Vice-Chairman*, Coun. Sir A. M. Sutherland.

Newport (Mon.) Corporation Tramways, Town Hall, Newport, Mon. [T.A., Dynamo, Newport, Mon.; T.N., 3111 and 2932, Nat.] *Gen. Manager*, N. J. Young; *Boro. Elec. and Tramways Eng.*, A. Nichols Moore; *Chairman Try. Com.*, Coun. J. Moxon; *Vice-Chairman*, Ald. F. Phillips.

Northampton Corporation Tramways, St. James', Northampton. [T.N., 279 & 280.] *Gen. Manager and Elec. Eng.*, J. F. Cameron; *Chairman Try. Com.*, Ald. James *Vice-Chairman*, Coun. Wareing.

Nottingham Corporation Tramways, Beastmarket Hill, Nottingham. [Tramways, Nottingham; T.N., 225.] *General Manager & Elec. Eng.*, John Aldworth; *Traffic Supt.*, H. Morley; *Per Way Eng.*, Arthur Brown (*City Eng.*); *Rolling Stock Supt.*, W. Boot; *Chairman Try. Com.*, Coun. Clarkson; *Vice-Chairman*, Ald. Turney.

Oldham Corporation Tramways, Wallshaw Depot, Oldham. [T.A., Tramways, Oldham; T.N., 1195.] *Gen. Manager & Eng.*, Wm. Chamberlain; *Traffic Supt.*, M. Mullin; *Chairman Try. Com.*, Coun. J. K. Cheetham; *Vice-Chairman*, Ald. W. Stanbury.

Perth Corporation Tramways, 128, High Street, Perth. [T.N., 226 & 101.] *Tramways Manager*, W. G. Snell; *Elec. & Tramways Eng.*, John Lambert; *Per. Way Eng.*, R. McKillop (*Burgh Surv.*); *Chairman Try. Com.*, Coun. A. W. Fisher.

Plymouth Corporation Tramways, Drake Circus, Plymouth. [T.N. 518, Plymouth.] *Gen. Manager*, H. P Stokes; *Elec. Eng.*, F. J. Okell; *Chairman Try. Com.*, Ald. Sir Thos. Baker; *Vice. Chairman*, Coun. J. Moon.

Pontypridd Urban District Tramways, Generating Station, Treforest, Pontypridd. [T.N. 33.] *Gen. Manager and Elec. Eng.*, J. E. Teasdel; *Traffic Supt.*, A. Armstrong; *Per. Way Eng.*, W. E. Lowe (*Surveyor*); *Chairman Try. Com.*, Coun. M. L. Jones.

Portsmouth Corporation Tramways, Town Hall, Portsmouth. [T.N., 4910 Corporation.] *Gen. Manager*, W. R. Spaven; *Elec. Eng., and Rolling Stock Supt.*, V. G. Lironi; *Traffic Supt.*, W. Munford; *Chairman Try. Com.*, Coun. J. Timpson, J.P. (Mayor); *Vice-Chairman*, Coun. W. Cleave.

Preston Corporation Tramways, Holmrook Road, Preston. [T.A., Corporation Tramways, Preston; T.N., 273.] *Gen. Manager and Elec. Eng.*, J. F. Simpson; *Assistant Manager and Engineer*, H. Clayton; *Chairman, Try. Com.*, Ald. T. Parkinson; *Vice-Chairman*, Ald. J. Ormrod.

Radcliffe Urban District Council Tramways, Council Offices, Radcliffe, Lancs. *Res. Eng.*, H. Wilkinson; *Per. Way Eng.*, W. L. Rothwell; *Clerk*, S. Mills; *Chairman Try. Com.*, Coun. Lund.
[These tramways are worked as part of the Bury system.]

Rawtenstall Corporation Tramways, Bacup Road, Rawtenstall. [T.N., 81.] *Gen. Manager and Elec. Eng.*, C. L. E. Stewart; *Chairman Try. Com.*, Coun. H. Crabtree; *Vice-Chairman*, Coun. J. W. Stansfield.

Reading Corporation Tramways, Mill Lane, Reading. [T.A., Tramways Manager, Reading; T.N., 330.] *Gen. Manager & Elec. Eng.* J. M. Calder; *Chairman Try. Com.*, Ald. C. G. Field, J.P.

Rochdale Corporation Tramways, Mellor Street, Rochdale. [T.A., Tramways, Rochdale; T.N., 48.] *Gen. Manager & Eng.*, G. Webster; *Traffic Manager*, R. Bentley; *Per. Way Eng.*, H. Yarwood; *Rolling Stock Supt.*, E. Sidgwick; *Chairman Try. Com.*, Ald. J. Taylor.

Rotherham Corporation Tramways, St. George's Hall, Rotherham. [T.A., Tramways, Rotherham; T.N., 152 and 241.] *General Manager*, T. P. Sykes; *Per. Way Eng.*, T. P. Collinge; *Traffic Supt.*, W. G. Marks; *Rolling Stock Supt.*, H. B. Sharp; *Chairman Try. Com.*, Ald. G. Gummer, J.P.; *Vice-Chairman*, Coun. G. E. Caine, J.P.

St. Annes-on-the-Sea Council Tramways, Squires Gate, South Shore, Blackpool. [T.N., 327.] *Gen. Manager*, H. W. Laing; *Traffic Manager*, G. W. Wood; *Chairman Try. Com.*, Coun. A. E. H. Lee.

St. Helens Corporation Tramways, Hall Street, St. Helens, Lancs. *Gen. Manager*, L. C. F. Bellamy; *Chairman Try. Com.*, Coun. A. Rudd, J.P.; *Vice-Chairman*, Coun. T. Abbott, J.P.

Salford Corporation Tramways, 32, Blackfriars Street, Salford. [T.A., Tramways, Salford; T.N., 5367 and 5368 Central.] *Gen. Manager*, Geo. W. Holford; *Elec. Eng.*, J. A. Robertson; *Traffic Supt.*, J. W. Blakemore; *Per. Way Supt.*, E. B. Martin; *Rolling Stock Supt.*, R. Chadwick; *Chairman Try. Com.*, Ald. H. Linsley, J.P.; *Vice-Chairman*, Ald. W. H. Barrett.

Sheffield Corporation Tramways, 8, Division Street, Sheffield. [T.A., Tramways, Sheffield; T.N., 4600.] *General Manager*, A. R. Fearnley; *Assist. Man.*, H. Watson; *Per. Way Eng.*, W. J. Hadfield; *Rolling Stock Supt.*, J. Smith; *Chairman Try. and Motors Com.*, Ald. Sir W. E. Clegg, J.P.; *Vice-Chairman*, Ald. W. C. Fenton, J.P.

Shipley Urban District Tramway, Dockfield, Shipley. [T.A., Electricity Works, Shipley; T.N., 190.] *Elec. Eng.*, Wm Redman; *Chairman Try. Com.*, Coun. F. F. Rhodes; *Vice-Chairman*, Coun. H. Bradley.
[Lines leased to Bradford Corporation.]

Southampton Corporation Tramways, 161, Above Bar, Southampton. [T.A., Tramways, Southampton; T.N., 301.] *Gen. Manager*, J. Dobson; *Boro. Elec. Eng.*, W. G. Turner; *Traffic Manager*, J. Brierley; *Chairman Try. Com.*, Ald. F. A. Dunsford, J.P.

Southend-on-Sea Corporation Tramways, London Road, Southend-on-Sea. [T.N., 96.] *Gen. Manager and Elec. Eng.*, R. Birkett; *Traffic Manager*, J. T. Fayle; *Per. Way Eng.*, R. H. Dyer (*Acting Boro. Surveyor*); *Rolling Stock Supt.*, J. Dobson; *Chairman Try. Com.*, Coun. C. Radford.

Southend Pier Electric Railway, (owned and worked by Southend-on-Sea Corporation), [T.A., Piermaster, Southend; T.N., 91.] Southend-on-Sea. *Elec. Eng.*, C. R. Norton; *Acting Piermaster*, J. C. Herbert; *Chairman*, Coun. F. Britain.

Southport Corporation Tramway, 1, Eastbank Street, Southport. [T.N., 551.] *Gen. Manager*, T. J. Kendrew; *Boro' Elec. Eng.*, A. S. Black; *Chairman Try. Com.*, Ald. Richardson; *Vice-Chairman*, Coun. Lloyd.

South Shields Corporation Tramways, Dean Road, South Shields. [T.A., Tramways, South Shields; T.N., 157.] *Gen. Manager & Elec. Eng.*, J. C. Whiteley; *Boro. Elec. Eng.*, Edgar Maxon; *Chairman Try. Com.*, Ald. W. G. Wylie; *Vice-Chairman*, Ald. J. G. Winskell.

Stalybridge Hyde, Mossley, and Dukinfield Tramways and Electricity Board, Waterloo Road, Stalybridge. [T.N., 311.] *Commercial Manager*, F. Schofield; *Chief Eng.*, R. Blackmore; *Chairman Try. Com.*, Ald. H. Sykes; *Vice-Chairman*, Coun. W. H. Rhodes.

Stockport Corporation Tramways, Mersey Square, Stockport. [T.N., 232 and 237.] *Manager*, A. T. Eardley; *Elec. Eng.*, R. Lomax; *Chairman Try. Com.*, Coun. T. W. Potts, O.B.E.; *Vice-Chairman*, Coun. W. Merrison.

Stockton and Thornaby Corporations Joint Tramways, Bridge Road, Stockton-on-Tees. [T.A., Tramways, Stockton; T.N., 129.] *Gen. Manager*, A. Forster; *Chairman Try. Com.*, Ald. F. T. Nattrass.

Sunderland Corporation Tramways, Tramway Offices, Monkwearmouth, Sunderland. [T.A., Trys. Manager, Sunderland; T.N., 948.] *Gen. Manager and Elec. Eng.*, A. R. Dayson; *Per. Way Eng.*, T. Inglis Rudman; *Chairman Try. Com.*, Ald. G. New, J.P.; *Vice-Chairman*, Ald. W. Walker, J.P.

Swindon Corporation Tramways, Electricity Works, Swindon. [T.A., Tramways Swindon; T.N., 4.] *General Manager*, T. Medcalf; *Elec. and Mech. Eng.*, F. Newey; *Chairman Try. Com.*, Ald. G. H. Stevens; *Vice-Chairman*, Coun. Noble.

Tees-side Railless Traction Board, Middlesbrough Road, South Bank, Yorkshire. [T.A. Railless Board, South Bank; T.N., 31, South Bank]. *General Manager and Engineer*, J. B. Parker; *Chairman*, Councillor W. G. Grace.

Wallasey Corporation Tramways, Seaview Road, Wallasey. [T.A., Tramways, Liscard; T.N., 1431, Liscard.] *General Manager*, R. R. Greene; *Elec. Eng.*, J. H Crowther; *Per. Way Eng.*, W. H. Travers; *Chairman Try. Com.*, Coun. F. E. Howse; *Vice-Chairman*, Coun. H. W. Griffin.

Walsall Corporation Tramways, St. Paul's Buildings, The Bridge, Walsall. [T.A., Tramways, Walsall; T.N., 238 & 559.] *Gen. Manager and Engineer*, Chas. Burgess; *Chief Assistant*, J. R. Taylor; *Rolling Stock Supt.*, M. J. Somerfield; *Chairman, Try. Com.*, Ald. J. Cope; *Vice-Chairman*, Ald. J. Williams.

Walthamstow Urban District Council Tramways, Chingford Road, Walthamstow, [T.A., Tramways, Walthamstow; T.N., 20.] *Tramways Manager*, W. Murray; *Elec. Eng.*, G. R. Spurr (Priory Avenue, Walthamstow); *Per. Way Eng.*, G. W. Holmes; *Chairman Trys. Com.*, Coun. J. W. West.

Warrington Corporation Tramways, Mersey Street, Warrington. [T.N., 196] *Gen. Manager*, J. Telfer; *Elec. Eng.*, F. V. L. Mathias; *Chairman Try. Com.*, Ald. Sir. P. Peacock, J.P.; *Vice-Chairman*, Ald. J. Wilkinson.

West Bromwich Corporation Tramway, Electricity Works, West Bromwich. [T.N., 100.] *Boro. Eng.*, A. D. Greatorex; *Boro. Elec. Eng.*, W. A. Jackson; *Chairman Highways Com.*, Ald. A. G. Turley, J.P.; *Vice-Chairman*, Coun. Wheatley.
[These tramways are leased to the South Staffs. (Lessee) Co., Ltd.]

West Ham Corporation Tramways, Greengate Street, Plaistow, London, E. [T.A., Trameurs, Plais., London; T.N., 862 and 868 East.] *General Manager*, L. Slattery; *Boro' Elec. Eng.*, F. W. Purse; *Chairman Try. Com.*, Coun. G. Croot.

West Hartlepool Corporation Tramways, Cleveland Road, West Hartlepool. [T.N., 6078.] *Gen. Manager and Eng.*, T. G. Richardson; *Chairman Try. Com.*, Ald. Martin; *Vice-Chairman*, Coun. Turnbull.

Wigan Corporation Tramways, Market Place, Wigan; [T.N., 226.] *General Manager and Eng.*, Ben Hall; *Rolling Stock Supt.*, J. H. Birch; *Per. Way Eng.*, R. B. Donald; *Chairman Try. Com.*, Coun. J. Carey; *Vice-Chairman*, Coun. J. Walkden.

Wolverhampton Corporation Tramways, Municipal Tramway Offices, Cleveland Road, Wolverhampton. [T.N., 324.] *Gen. Manager and Engineer*, C. O. Silvers; *Boro. Elec. Eng.*, S. T. Allen; *Per. Way Eng.*, George Green; *Chairman Try. Com.*, Ald. Sir S. Craddock.

Yarmouth Corporation Tramways (See Great Yarmouth Corporation Tramways).

York Corporation Tramways, 8, Clifford Street, York. [T.N., 302]. *Gen. Manager and Elec. Eng.*, J. W. Hame; *Traffic Supt.*, J. W. Horton; *Per. Way Eng.*, F. W. Spurr (City Surveyor); *Chairman Try. Com.*, Coun. W. H. Sessions; *Vice-Chairman*, Ald. C. W. Shipley.

COMPANY TRAMWAYS

Aberdeen Suburban Tramways Company, 15, Golden Square, Aberdeen. [T.A., Judicial, Aberdeen; T.N., 2583.] *Manager & Per. Way Eng.*, A. Wilkie; *Sec.*, G. Duncan; *Chairman*, James Mearns; *Directors*, Dr. W. Christie, Jas. Sellar.

Airdrie and Coatbridge Tramways Company, Tramway Depôt, Main Street, Coatbridge [T.N., 105], and Electrical Federation Offices, Kingsway, London, W.C. *Gen. Manager*, A. Robertson; *Sec.*, P. N. Gray; *Chairman*, W. L. Madgen; *Directors*, H. S. Day, A. C. Miles, G. J. Somerville.

Barnsley and District Electric Traction Company, Ltd., Car Depot, Sheffield Road, Barnsley. [T.A., Tramways, Barnsley; T.N., 159.] *General Manager*, W. E. Nicoll; *Acting Sec.*, P. N. Gray; *Chairman*, E. Garcke; *Directors*, Col. Sir Thomas Pilkington. Bart., E. A. Paris.

Barrow-in-Furness Tramways, Salthouse Road Depot, Barrow.
[These Tramways have been purchased, and are now worked by Barrow-in-Furness Corporation.]

Bath Electric Tramways Company, Ltd., 10, Northgate Street, Bath, and 119-125, Finsbury Pavement, London, E.C. [T.A., Trams, Bath; T.N., 1214.] *Gen Manager and Eng.*, W. E. Hardy; *Traffic Supt.*, — ————; *Sec.*, H. J. Almond; *Chairman*, J. B. Hamilton; *Directors*, H. F. Clutterbuck, E. H. R. Trenow, A. A. C. Swinton.

Bessbrook and Newry Tramway Company, Bessbrook, Co. Armagh. [T.A., Tramways, Bessbrook.] *Manager*, M. Hamilton; *Eng.*, H. Dowell; *Chairman*, J. N. Richardson; *Directors*, C. H. Richardson, R. T. Scott, T. W. Richardson, J. McGreggor Greer.

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ELECTRIC TRAMWAYS IN THE UNITED KINGDOM

Birmingham District Power and Traction Company, Power Station, Downing Street, Smethwick, and Electrical Federation Offices, Kingsway, London, W.C. [T.A., Power Station, Smethwick; T.N., 65 Smethwick.] *Gen. Manager*, W. G. Bond; *Secretary*, B. Kingsford; *Chairman*, C. Shirreff Hilton; *Directors*, J. A. Lycett, W. L. Madgen, S. R. Blundstone, R. J. Howley.

Blackpool and Fleetwood Tramroad. [This Tramway is now owned and worked by Blackpool Corporation.]

Blackpool and Fylde Light Railway Company, 5, Clifton Street, Blackpool. (No appointment of engineer or officials yet made.) *Secretary*, R. Bibby; *Chairman*, John Greenwood; *Directors*, T. Fisher, J.P., John Platt, J.P., W. Hardman, J.P., R. H. Mabbott.

Brighton Beach Electric Railway, Madeira Road, Brighton. [T.A., Volk, Brighton; T.N., 14 P.O.] *Manager and Eng.*, Magnus Volk; *Traffic Superintendent*, Miss Barton; *Per. Way Eng.*, J. Barker; *Secretary*, A. Volk; *Chairman*, Magnus Volk; *Directors*, M. H. Volk, B. W. Symonds, A. Volk.

Bristol Tramways and Carriage Company, Ltd., Clare Street House, Bristol. [T.A., Cab, Bristol; T.N., 74 & 3074 Nat.] *Manager*, Colonel S. E. Smith; *Assist. Manager*, W. H. Stradling; *Electrical Engineer*, W. Nairn; *Permanent Way Engineer*, G. T. C. Edwards; *Secretary*, H. F. Cooper; *Chairman*, S. White, J.P.; *Directors*, W. G. Verdon Smith (*Managing*), J. H. Howell, J.P., Sir G. Stanley White, Bart., S. E. Baker, Chas. Challenger.

British Electric Traction Company, Ltd., Electrical Federation Offices, Kingsway, London, W.C. J. S. Austen (*chairman*); *Directors*, E. Garcke, C. Shirreff Hilton, W. L. Madgen, Sir Charles Ollivant, A. Shepherd, C. G. Tegetmeier, P. D. Tuckett, *Manager*, C. H. Dade; *Secretary*, T. Bower; *Accountant*, C. Walmsley.

This company is interested in the following tramways, particulars of which are given under their respective names:

Airdrie & Coatbridge.
Barnsley & District.
Barrow-in-Furness.
Birmingham & District Power & Traction Co.:
Birmingham & Midland
Dudley, Stourbridge, & District.
South Staffordshire.
Wolverhampton Dist.
Devonport & District.
Gateshead & District.
General Elec. Tramways.
Gravesend & Northfleet.
Greenock & Port Glasgow.
Jarrow & District.
Kidderminster & District.
Merthyr.
Middleton.
Oldham, Ashton, & Hyde.
Peterborough.
Potteries.
Rothesay.
Sheerness & District.
Swansea.
Taunton.
Tynemouth & District.
Weston-super-Mare & District.
Worcester.
Wrexham & District.
Yorkshire (Woollen Dist.)

Burton and Ashby Light Railway, Power Station, Swadlincote, nr. Burton-on-Trent. [T.A., Toulmin, Swadlincote; T.N., 1.] *Manager and Eng.*, Jas. Toulmin; *Secretary*, W. N. Bancroft; *Chairman*, G. Murray Smith.

[The line is owned and worked by the Midland Railway Company.]

Camborne and Redruth Tramways, Elec. Works, Carn Brea, R.S.O., Cornwall. [T.N., 3, Camborne.] (Owned by Urban Elec. Supply Co.) *Manager and Eng.*, L. A. Hards; *Sec.*, C. H. Jones; *Chairman*, P. D. Tuckett; *Directors*, E. Charrington, H. B. Grotian, Sir Douglas Owen.

Carlisle Tramways Company, Ltd., City of, Depot and Offices, London Road, Carlisle. [T.A., Tramways, Carlisle; T.N., 0180.] *Engineer and Manager*, E. W. Sleight.

Chatham and District Light Railways Company, Luton Road, Chatham, and 83, Cannon Street London, E.C. [T.A., Tramways, Chatham; T.N., 51.] *General Manager*, W. Jensen; *Assist. Manager*, A. J. Bousfield; *Secretary*, A. Clements; *Chairman*, A. R. Monks; *Directors*, H. C. Levis, J. F. Nauheim, W. B. H. Martindale.

Cheltenham and District Light Railway Company, Cheltenham. [T.N., 341.] *Chairman*, A. R. Holland; *Directors*, A. H. Beatty, W. Shearer, H. L. Williams, A. S. Guinness, H. J. McCormick; *Sec.*, Wm. C. Bryden, C.A., 66, Queen Street, London, E.C.; *Local Eng. and Manager*, Henry J. McCormick, Dalkeith, Gloucester Road, Cheltenham.

Clontarf and Hill of Howth Tramroad Company, 39, Dame Street, Dublin. [T.A., c/o Railways, Dublin; T.N., 917.] *Secretary*, J. P. Chapman; *Chairman*, W. L. Murphy; *Directors*, E. Anderson, J. J. Dudley.

Cork Electric Tramways and Lighting Company, Ltd., Albert Street, Cork. [T.A., Tramways, Cork; T.N., 78 and 535.] *Manager and Engineer*, H. H. Nalder; *Traffic Manager*, H. G. Whiting; *Per. Way Engineer*, H. Mack; *Secretary*, A. Clements; *Chairman*, A. R. Monks; *Directors*, E. Anderson, Capt. W. Martindale, H. C. Levis.

Dartford Urban District Council Light Railways. Car Depot, Priory Road, Dartford. [T.N., 31 Dartford.] (Leased to and worked by Bexley Urban District Council, Broadway, Bexleyheath, Kent).

Devonport and District Tramways Company, Electrical Federation Offices, Kingsway, London, W.C. *Secretary*, S. M. Wright; *Acting Sec.*, P. N. Gray; *Chairman*, C. S. B. Hilton; *Directors*, J. S. Raworth, E. R. Soames, C. G. Tegetmeier, R. J. Sutcliffe.

[This Company's undertaking has been sold to Plymouth Corporation.]

Dewsbury, Batley, and Birstall Tramways Company, Ltd., Electrical Federation Offices, Kingsway, London, W.C.

[Lines worked by Yorkshire (Woollen District) Electric Tramways, Ltd., *q.v.*]

Dewsbury and Ossett Corporation and Soothill Nether Urban District Council Tramways, (Lessees: The National Elec. Construction Co., Ltd., 62 and 63, Queen Street, London, E.C.) [T.A., Overhauled, London; T.N., 6616 and 6617 City.] *Manager*, W. McGibbon.

Douglas—Ramsey, (The Manx Elec. Rly. Company), 1, Strathallan Crescent, Douglas. (See Manx Electric Railway Company).

Douglas Southern Electric Tramways, Ltd., Marine Drive, Douglas, Isle of Man, and 24, Brazennose Street, Manchester. [T.A., Traffic, Douglas.] *Manager and Eng.*, R. Orton; *Sec.*, J. E. Sharples; *Chairman*, T. J. Hutchinson; *Directors*, I. E. Winslow, E. A. Hopkins.

Dublin and Lucan Electric Railway Company, 15, Conyngham Road, Dublin. [T.A., Lucan Tramway, Dublin; T.N. 2282, 4005 and 4006 Dublin, and 5 Lucan.] *Manager, Elec. Eng., and Sec.*, D. McDowall Grosart, J.P.; *Chairman*, J. W. Hill, J.P.; *Directors*, E. Anderson, J.P., A. B. Coyle, J.P., G. V. Murphy, J. R. Dillon.

Dublin United Tramways Company (1896), Ltd., 9, Upper Sackville Street, Dublin. [T.A., Tramways, Dublin; T.N., 58 and 59.] *Gen. Manager*, G. Marshall Harriss; *Elec. Eng.*, R. Tanham; *Con. Eng.*, H. F. Parshall; *Per. Way Eng.*, P. F. O'Sullivan; *Secretary*, W. McHugh; *Chairman*, Rt. Hon. L. A. Waldron, P.C.; *Directors*, Joseph Mooney, J.P., William Hewat, Capt. Wm. L. Murphy.

Dudley, Stourbridge and District Electric Traction Company, Ltd. (Section of The Birmingham and Midland Tramways Joint Committee), Power Station, Downing Street, Smethwick, Brierley Hill, Staffs., and Electrical Federation Offices, Kingsway, London, W.C. [T.N., 65 Smethwick.] *General Manager*, W. G. Bond; *Secretary*, E. H. Woodhall; *Chairman*, S. R. Blundstone; *Directors*, J. A. Lycett, R. J. Howley, B. Kingsford (*Acting Sec.*)

Dumbarton Burgh and County Tramways Company, Tramway Depot, Dumbarton, and 28, Rutland Street, Edinburgh. [T.A., Tramways, Dumbarton; T.N., 119.] *Gen. Manager and Elec. Eng.*, J. P. McMahon; *Secretary*, A. Dishart; *Chairman*, G. Balfour; *Directors*, K. Sanderson, K. A. Scott Moncrieff.

Dundee, Broughty Ferry & District Tramways Company, Milton, Monifieth, N.B. [T.N., 24 Monifieth.] *Gen. Manager and Engineer*, George Brander; *Secretary*, E. Cowan; *Chairman*, George Balfour; *Directors*, Edward Cowan, David Hynd.

Dunfermline and District Tramways Company, Tramway Depot, Cowdenbeath, Fife, and 8, New Row, Dunfermline. *Manager and Engineer*, J. H. Shepherd; *Secretary*, G. A. Nicolson; *Cons. Engs.*, Hawtayne & Zeden; *Directors*, Wm. Low, G. Balfour (*managing*), K. Sanderson, D. Hynd.

Falkirk & District Tramways Company, Larbert Road, Larbert, Stirlingshire. [T.A., Tramways Co., Falkirk; T.N., 154 Falkirk.] *Gen. Manager and Engineer*, D. Hays; *Chairman*, G. M. Brown; *Directors*, A. W. Tait, R. Hunter, G. Balfour, C. D. Geddes.

Felixstowe Pier Railway, Felixstowe. (The Coast Development Corporation, Ltd.) *Elec. Eng.*, E. A. Lambert.

Gateshead and District Tramways Company, Tramway Depôt, Sunderland Road, Gateshead, and Electrical Federation Offices, Kingsway, London, W.C. [T.A., Tramway Depôt, Gateshead; T.N., 125 & 408 Gateshead.] *General Manager*, William Morrison; *Secretary*, H. W. Davis; *Chairman*, H. S. Day; *Directors*, H. A. Stagg, C. R. Greene, J.P., Judge L. A. Atherley-Jones, K.C.

Giant's Causeway and Portrush Electric Tramway Company, Portrush. *Manager & Sec.*, W. McCurdy; *Elec. Eng.*, W. A. Traill; *Chairman*, J. S. Moore; *Directors*, A. B. Stuart, W. A. Traill.

Glossop Tramways, Electricity Works, Glossop (owned by the Urban Electric Supply Co.) [T.N., 31, Glossop.] *Manager and Res. Eng.*, C. E. Knowles; *Rolling Stock Supt.*, T. L. Podmore; *Secretary*, C. H. Jones; *Chairman*, P. D. Tuckett; *Directors*, E. Charrington, F. E. Gripper, H. B. Grotrian, D. Owen.

Gosport and Fareham Tramways, Tramways and Lighting Office, Gosport, Hants., and Moorgate Station Chambers, London, E.C. [T.A., Tramways, Gosport; T.N., 3, Post Office, Gosport.] *Eng. and Manager*, J. Fereday Glenn; *Sec.*, J. Barber Glenn; *Chairman*, A. Beattie, J.P., D.L.; *Directors*, J. Barber Glenn (*managing*), S. Hern.

Gravesend & Northfleet Electric Tramways, Ltd., Tramway Depot, Northfleet, Kent, and Electrical Federation Offices, Kingsway, London, W.C. [T.N., 258, Gravesend.] *Manager*, P. R. Blake; *Sec.*, H. C. Walter; *Acting Sec.*, J. S. Bowker; *Chairman*, E. Garcke; *Directors*, W. L. Madgen, P.N. Gray, W. S. Wreathall.

Great Crosby Tramways, 31, James Street, Liverpool.

[This tramway is worked by the Liverpool Overhead Railway Company.]

Great Grimsby Street Tramway Co., Southampton House, Cleethorpes, and Moorgate Station Chambers, London, E.C. [T.A., Blanco, Cleethorpes; T.N., 16.] *Manager and Eng.*, H. L. White; *Elec. Eng.*, H. O. White; *Managing Director and Secretary*, J. B. Glenn; *Chairman*, A. Beattie, J.P., D.L.; *Director*, S. Hern

Greenock and Port Glasgow Tramways Company, Ladyburn, Greenock, and Electrical Federation Offices, Kingsway, London, W.C. [T.A., Tramways, Greenock; T.N., 562]. *Manager*, A. Robertson; *Secretary*, P. N. Gray; *Chairman*, W. L. Madgen; *Directors*, G. J. Somerville, A. C. Miles, H. S. Day.

Guernsey Railway Company, Ltd., Hougue-à-la-Perre, Guernsey. *Manager and Elec. Eng.*, Arthur G. Bird; *Sec.*, J. de Mouilpied; *Chairman*, G. F. Peek; *Directors*, W. D. Murdoch, J. B. Collings, Q. Le Pelley, T. W. Palmer.

Hampshire Light Railway (Electric) Company, Ltd., Moorgate Station Chambers, London, E.C. *Secretary*, J. B. Glenn; *Chairman*, A. Beattie, J.P.; *Directors*, J. Barber Glenn (*managing*), S. Hern.

[This company works the Portsdown and Horndean Light Railway.]

Hastings Tramways Company, Ltd., Beaufort Road, Silverhill, St. Leonards-on-Sea, and 1, Queen Victoria Street, London, E.C. [T.A., Tramways, Hastings, and Enshrine, London; T.N., 90 Hastings, and 3465, City]. *General Manager and Elec. Eng.*, W. Vincent Edwards; *Secretary*, W. R. Elston; *Chairman*, G. Kitchen; *Directors*, J. C. Williamson, Dr. Moody.

Imperial Tramways Company, Ltd., Clare Street House, Bristol. *Secretary*, F. H. Withers; *Manager*, F. Freshwater; *Chairman*, S. White, J.P.; *Directors*, W. G. Verdon Smith (*Managing*), J. H. Howell, Sir G. Stanley White, Bart.

Isle of Thanet Electric Tramways and Lighting Company, Ltd., St. Peter's, Kent, and Moorgate Station Chambers, London, E.C. [T.A., Tramways, St. Peters, Kent; T.N., 29 Broadstairs]. *Gen. Manager and Elec. Eng.*, J. A. Forde; *Traffic Supt.*, A. L. Gardener; *Secretary*, J. Barber Glenn; *Chairman*, A. R. Monks; *Directors*, Lord Arthur Butler, H. Brown.

Jarrow and District Electric Traction Company, Ltd., Electrical Federation Offices, Kingsway, London, W.C. [T.A., Jarrow, c/o Tramway, London; T.N., 2686 Holborn.] *Traffic Manager*, G. McClelland; *Secretary*, C. W. Francis; *Acting Sec.* H. A. Stagg; *Chairman*, G. J. Somerville; *Directors*, W. Morrison (*managing*), H. S. Day.

Kidderminster & District Electric Lighting and Traction Co., Ltd., Kidderminster, and Electrical Federation Offices, Kingsway, London, W.C. [T.N., 108]. *General Manager*, W. G. Bond; *Secretary*, B. Kingsford; *Chairman*, E. Garcke *Directors*, J. A. Lycett, H. S. Day, W. L. Madgen.

Kinver Tramway, Kinver, and Electrical Federation Offices, Kingsway, London, W.C., *q.v.*, Dudley Stourbridge, and District Elec. Traction Co., Ltd.

Lanarkshire Tramways Company, Edinburgh Road, Motherwell, N.B., and 83, Cannon Street, London, E.C. [T.A., Tramways, Motherwell; T.N., 64.] *Gen. Manager and Eng.*, G. F. Moller; *Elec. Eng.*, E. H. Glennie; *Per. Way Eng.*, R. Foster; *Traffic Supt.*, J. L. White; *Sec.*, A. Clements; *Chairman*, A. R. Monks; *Directors*, Lord Carmichael, Sir B. Cunard, Bart., H. C. Levis, J. F. Nauheim.

Lancashire United Tramways Limited, Atherton, Lancs. [T.A., Tramways, Atherton; T.N., 36, Atherton.] *Gen. Manager and Engineer*, E. H. Edwardes; *Secretary*, J. R. Holt; *Chairman*, Hon. Sir A. Stanley, G.B.E.; *Directors*, J. M. Henderson, J.P., R. Watson, J.P., A. Adam, J. S. Austen.

Liverpool and Prescot Light Railway.—This line, which with the St. Helens Corporation Tramways forms the connecting link between the City of Liverpool and South Lancashire Tramways, is owned and worked by the Liverpool Corporation.

Liverpool Overhead Railway Company, 31, James Street, Liverpool. [T.A., Motor, Liverpool; T.N., 5463 Central.] *Gen. Manager and Eng.*, E. J. Neachell; *Secretary*, H. G. Alexander; *Chairman*, H. C. Woodward; *Directors*, J. E. Anderson, G. D. Killey, J. U. Hodgson, M. H. Makwell.

Llandudno and Colwyn Bay Electric Railway, Limited, Tramway Depôt, Rhôs-on-Sea, Colwyn Bay, and Basildon House, Moorgate Street, London, E.C. *Gen. Manager*, Alex. G. Balfour; *Secretary*, A. W. R. Lovering; *Directors*, G. Balfour, A. W. Tait, T. Stoker.

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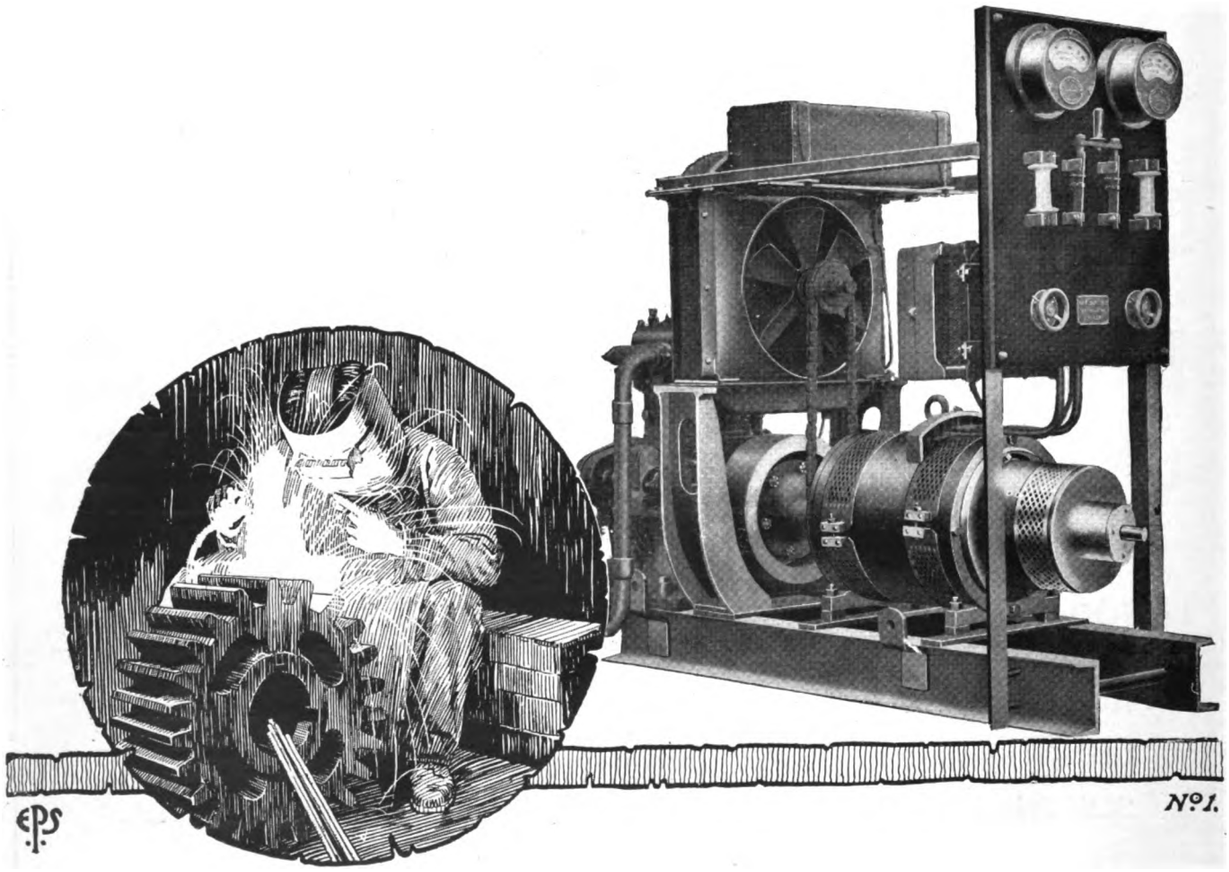

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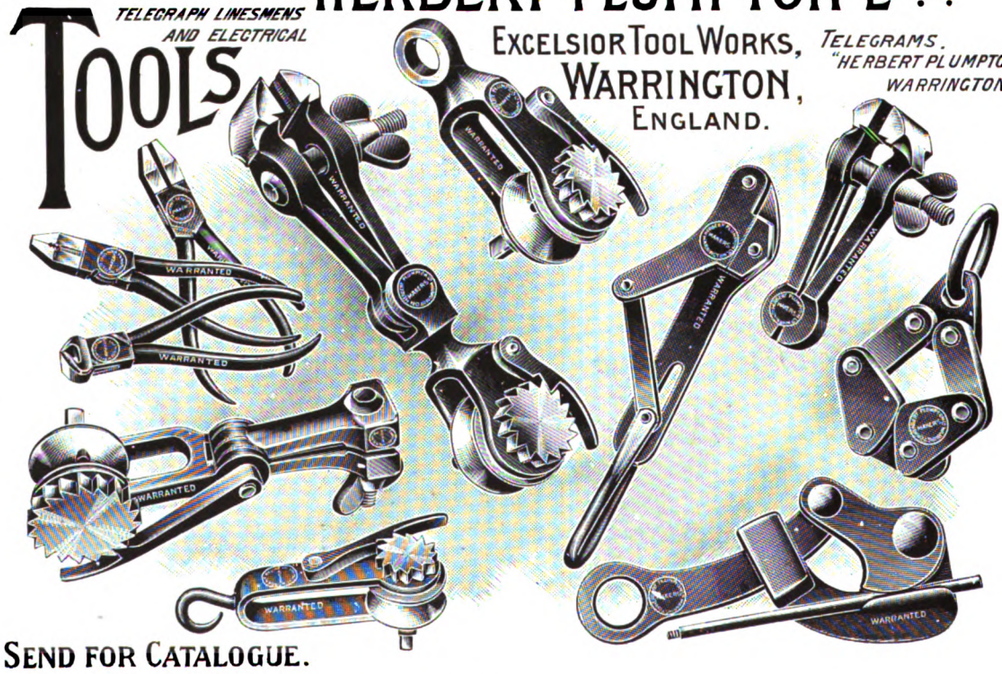

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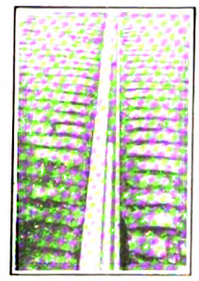
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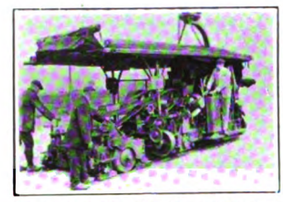
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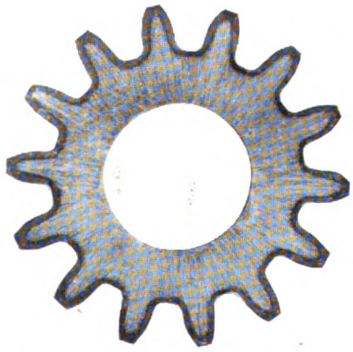
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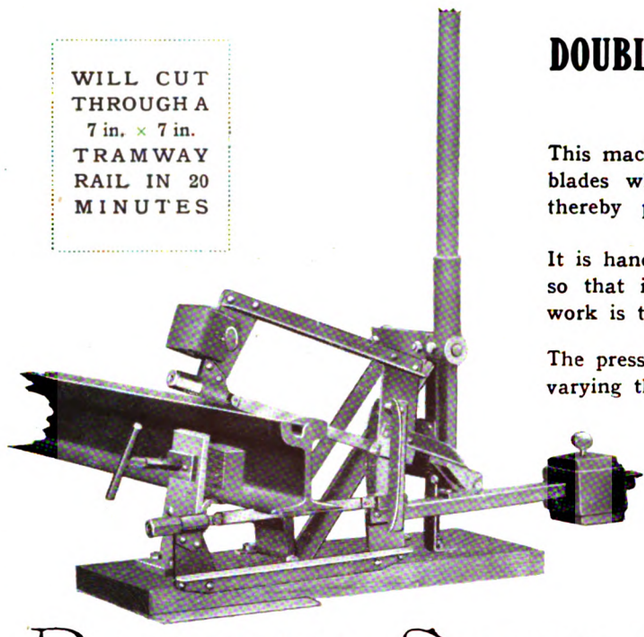

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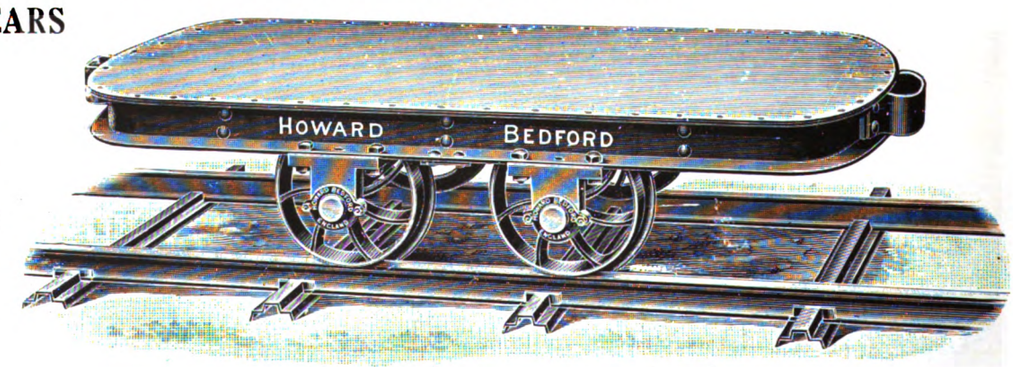

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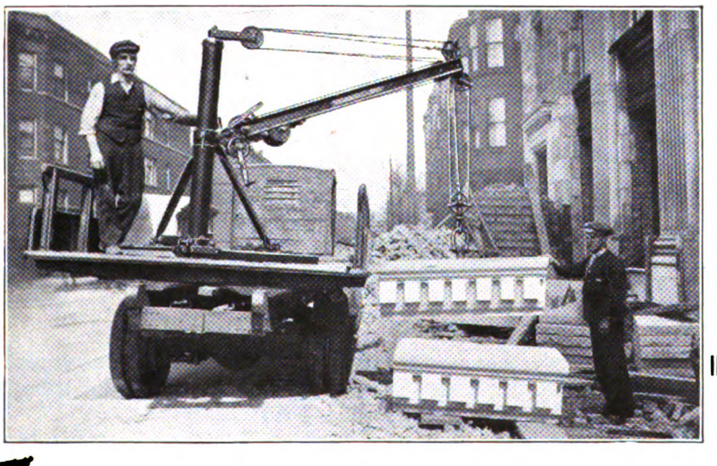

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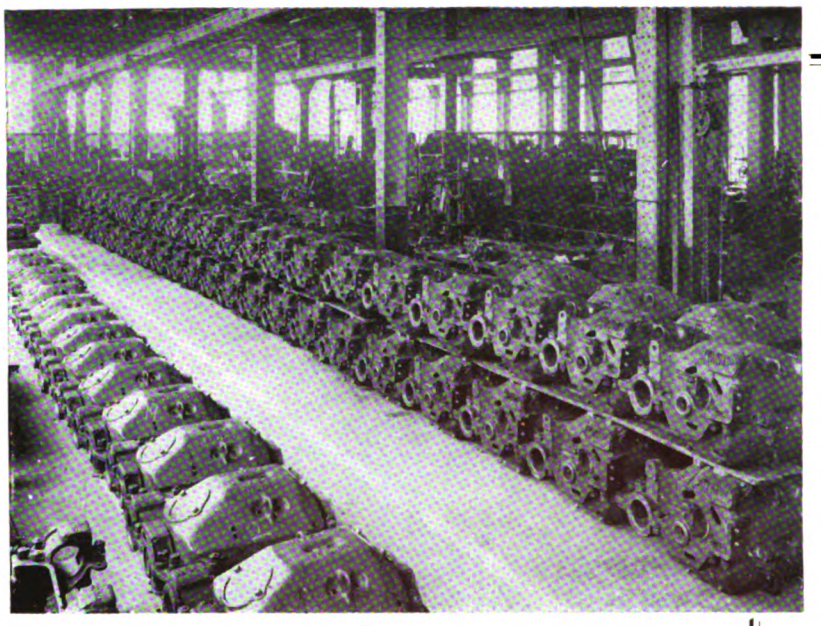

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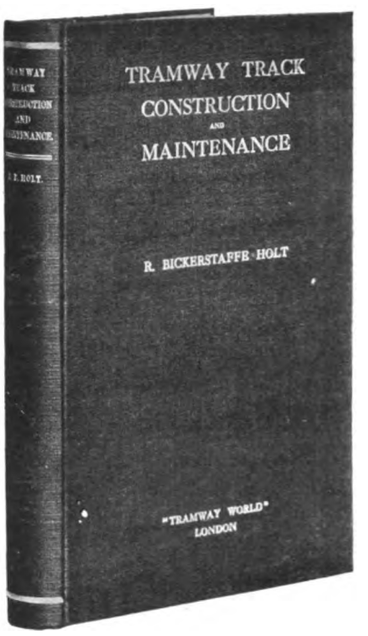

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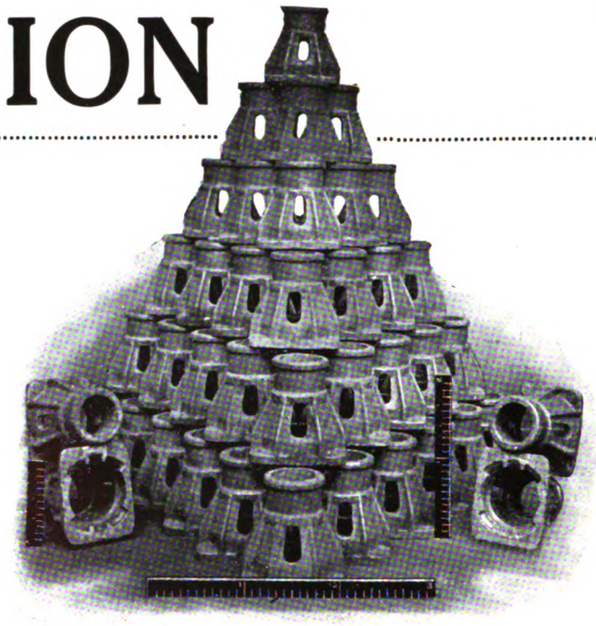

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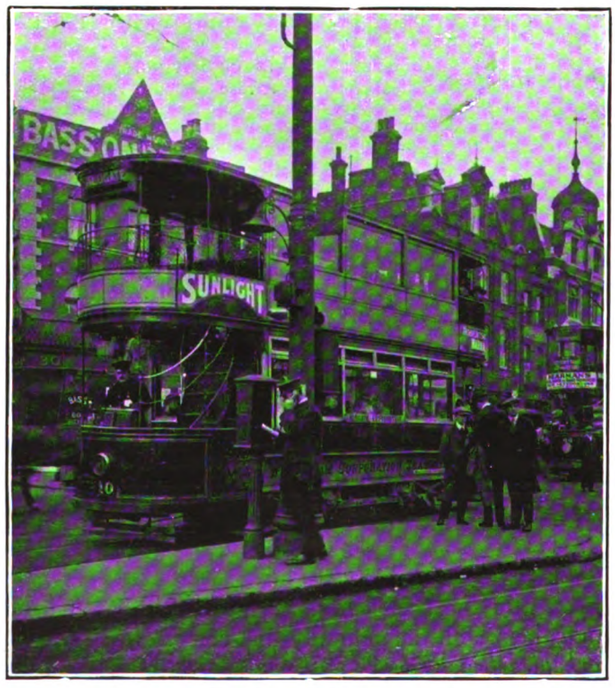

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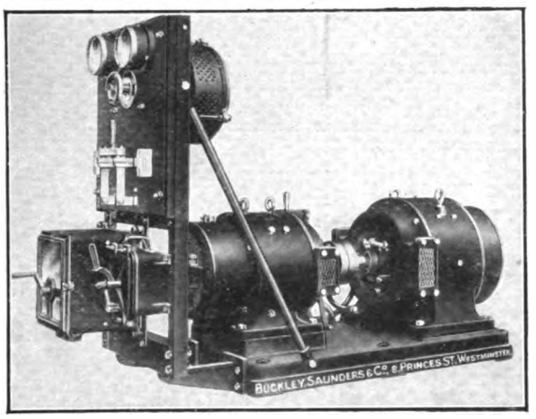

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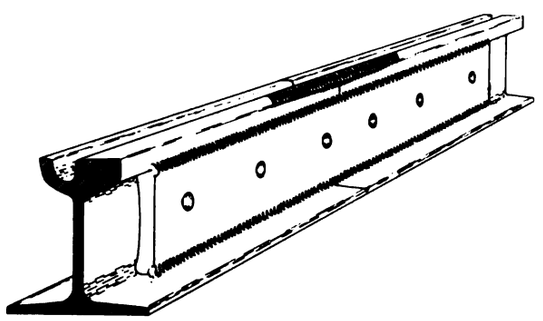

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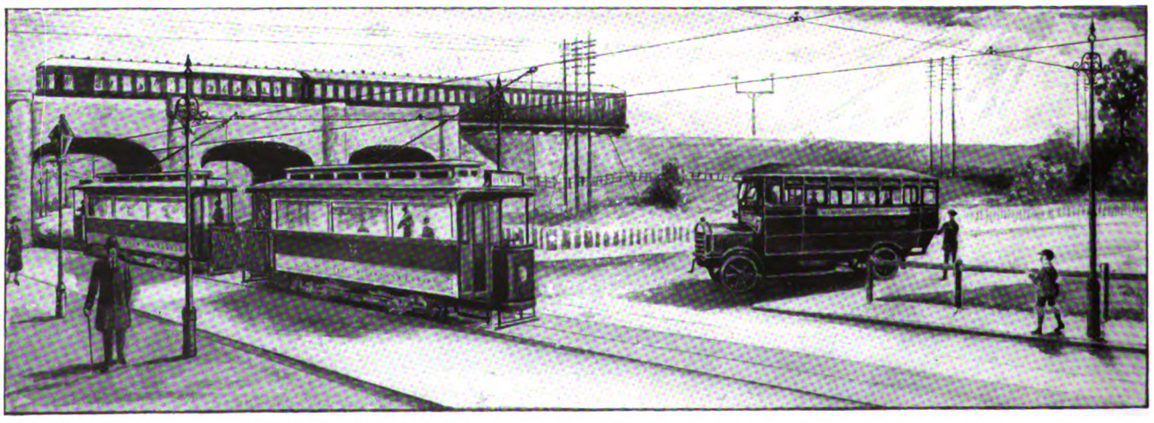

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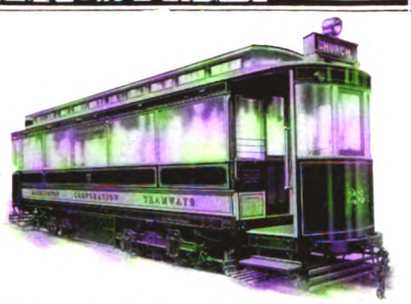

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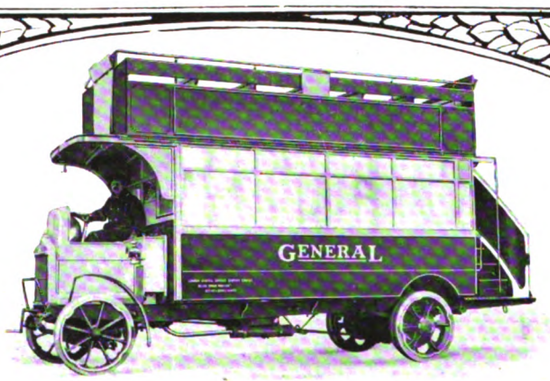

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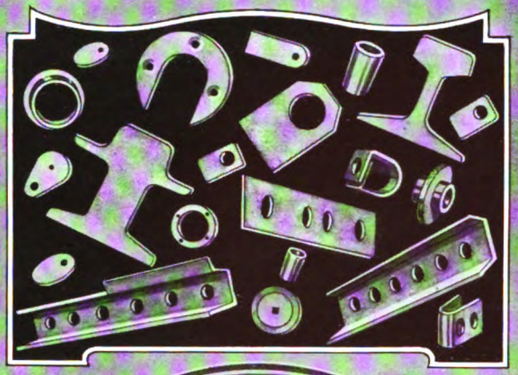

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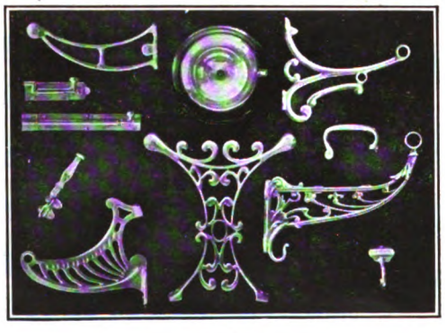

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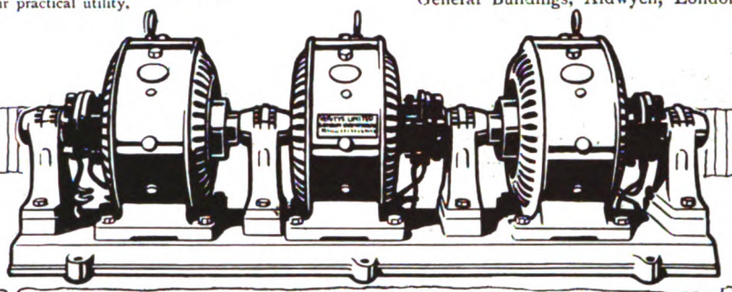

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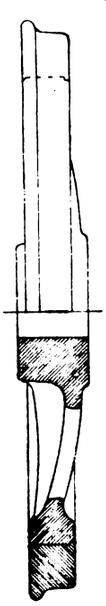

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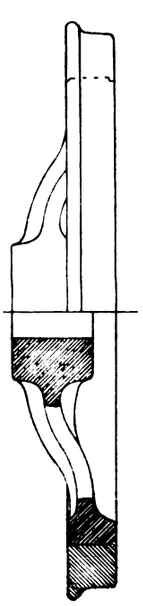

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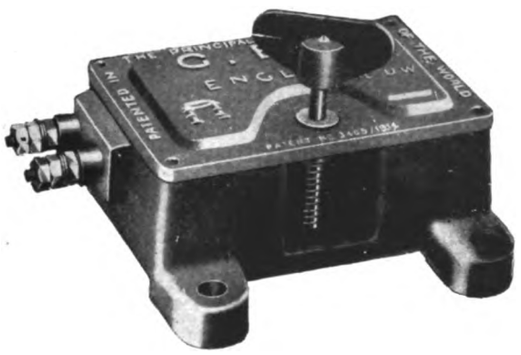

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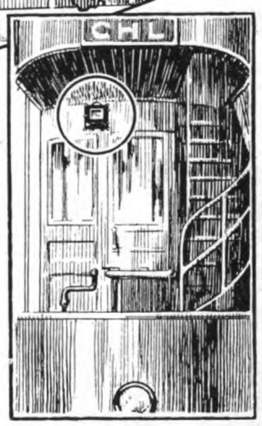

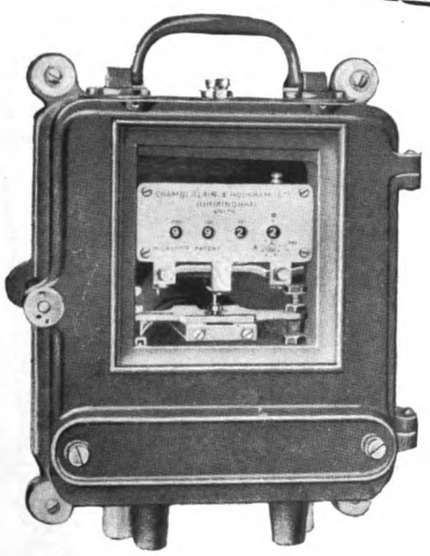

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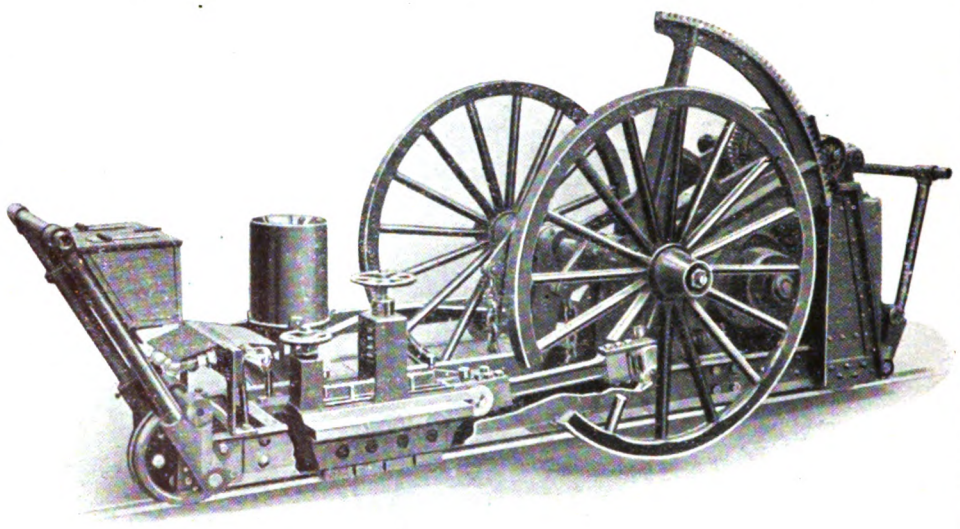

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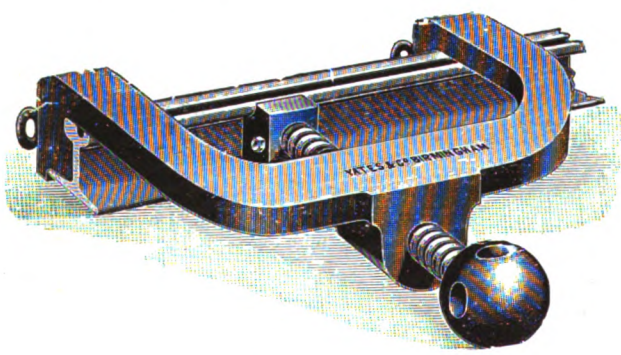

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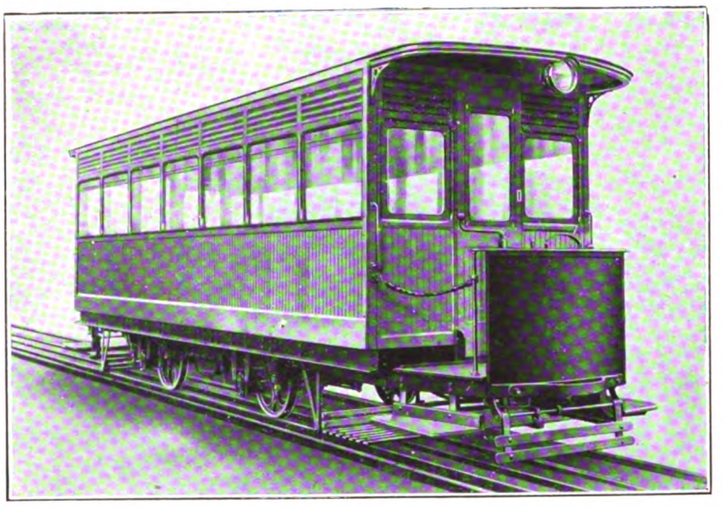

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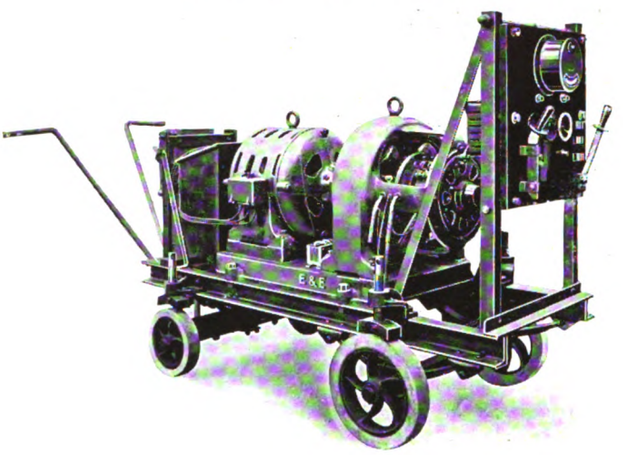

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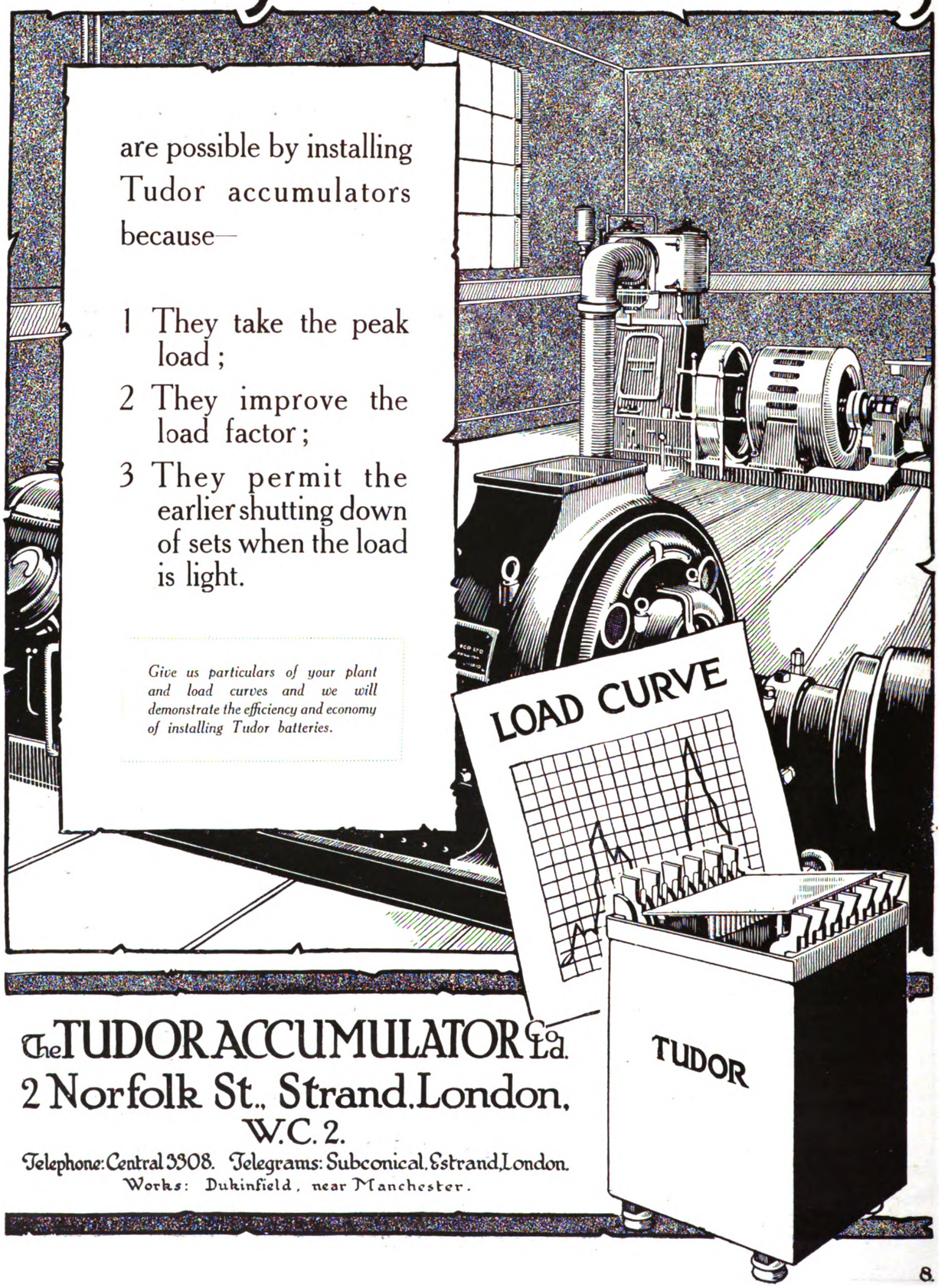

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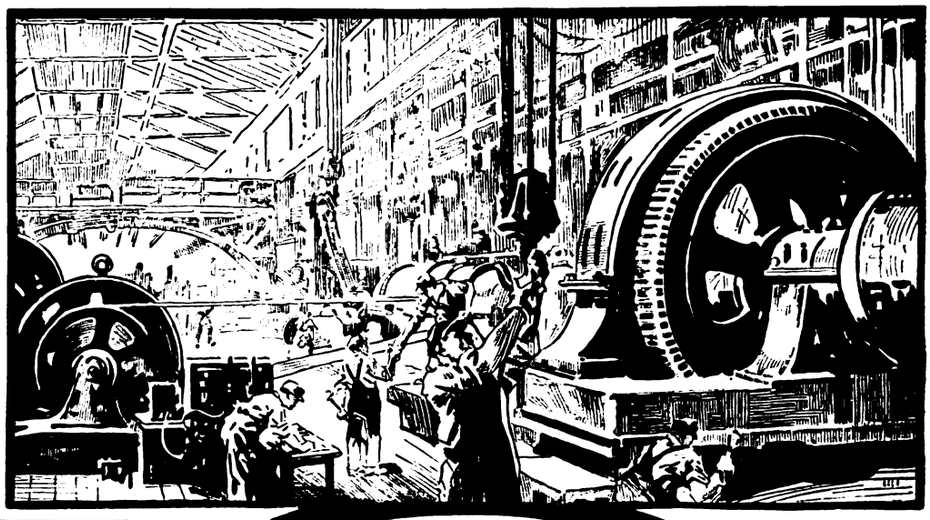

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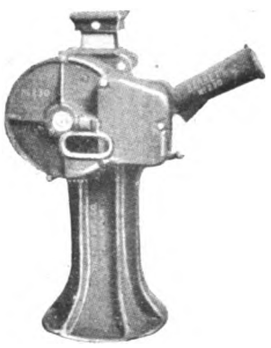
159	25	9	3¼
259	25	11	5¼
53	15	9¾	4
52	15	11	5

Geared Automatic Lowering Jack



Jack No.	Capacity in Tons	Height Inches	Raise Inches
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29	25	28	17

Duff Genuine Barrett Automatic Lowering Jack No. 2

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Jack No.	Capacity in Tons	Height Inches	Raise Inches	Size of Bar Inches	Weight with Lever
2	10	21	10	1⅝ × 1⅝	73 lbs.

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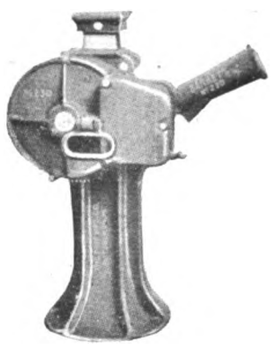

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Jack No.	Capacity in Tons	Height Inches	Raise Inches	Size of Bar Inches	Weight with Lever
2	10	21	10	1⅝ × 1⅝	73 lbs.

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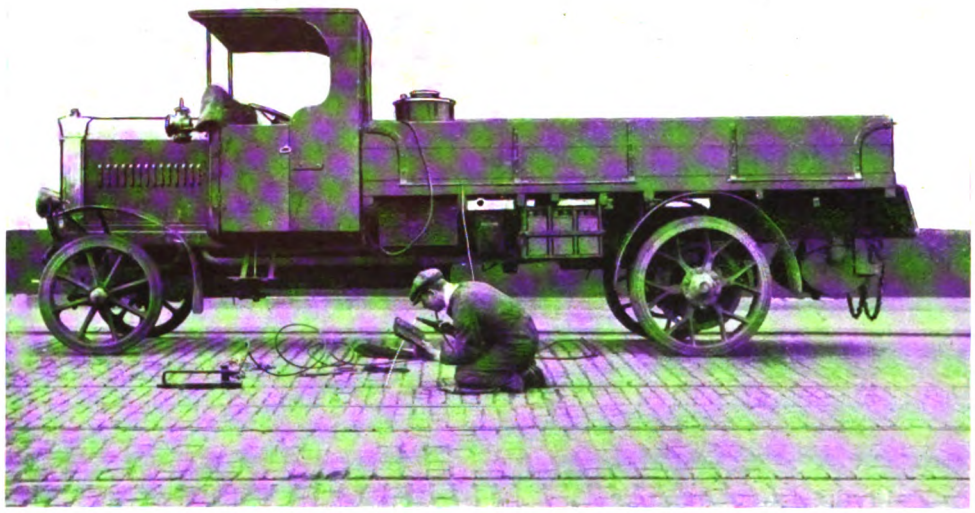

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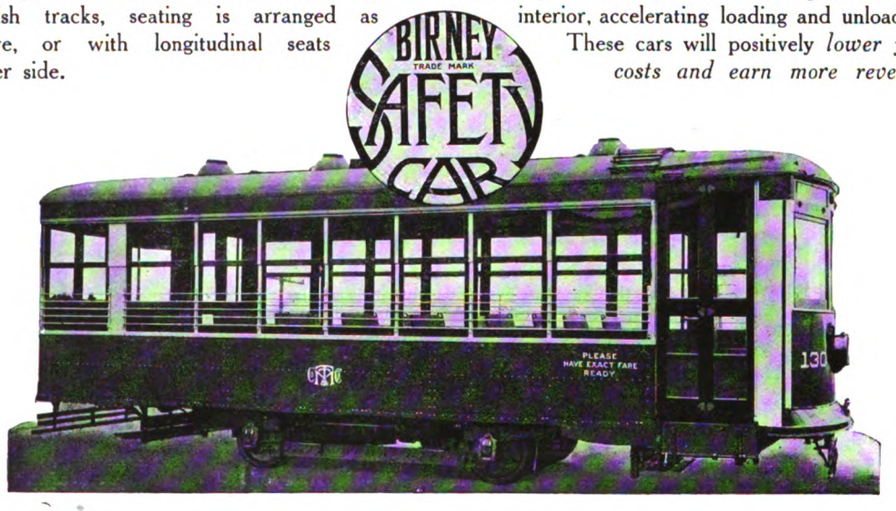

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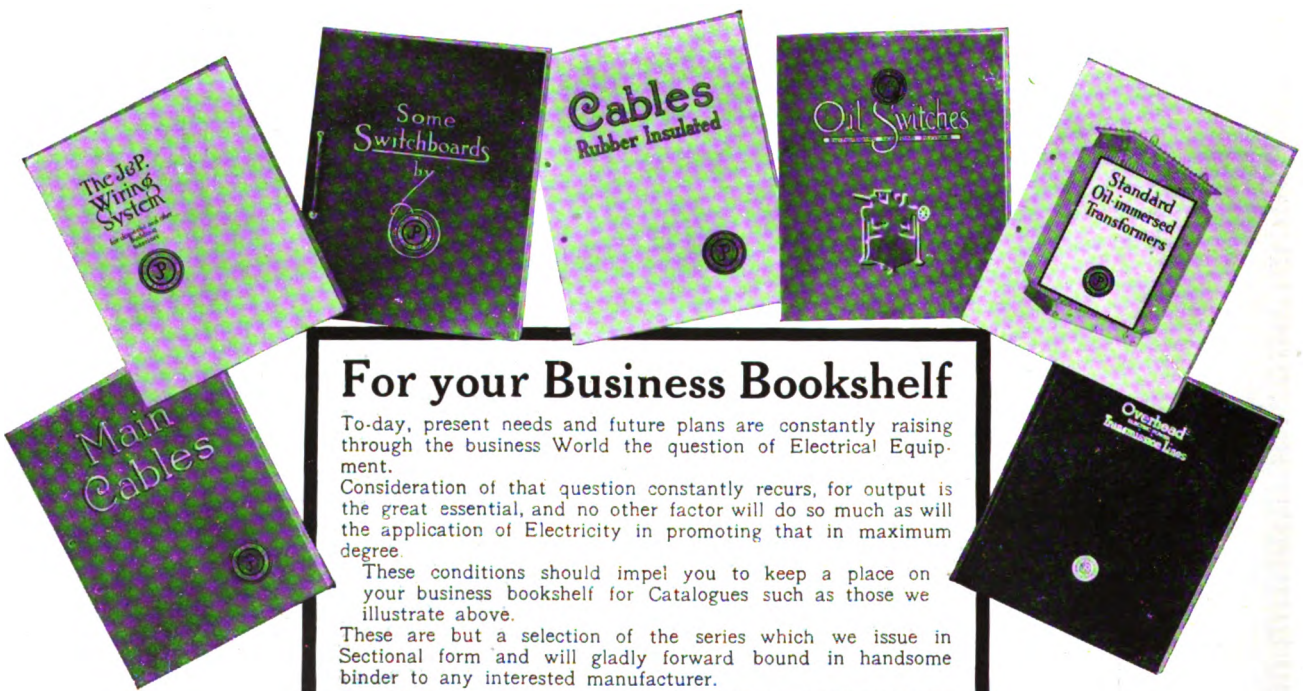

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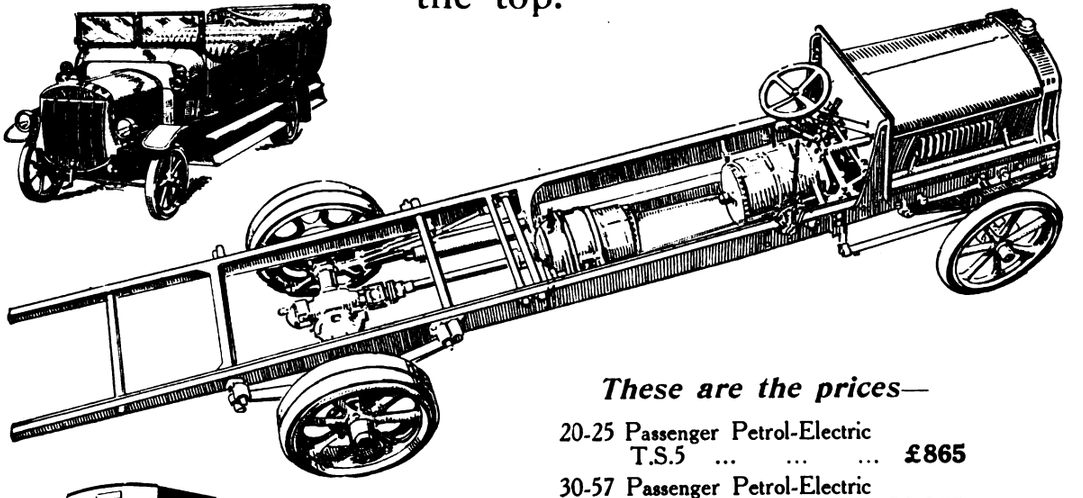

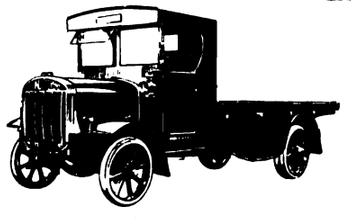

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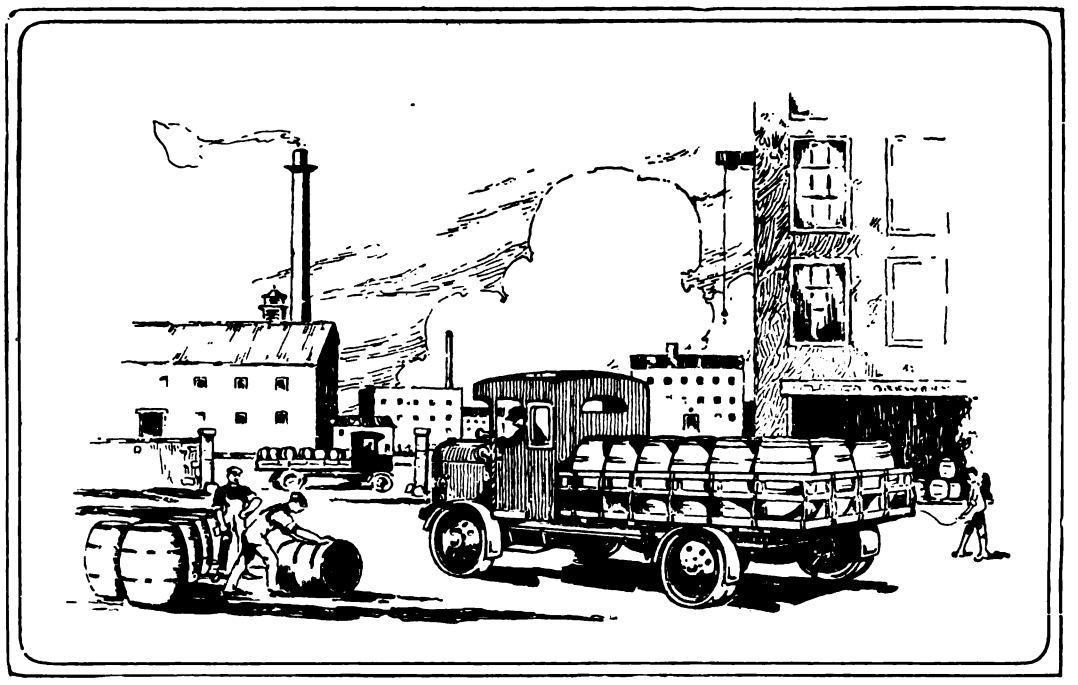

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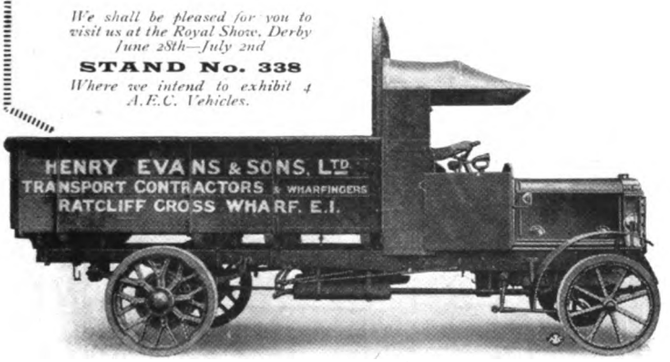

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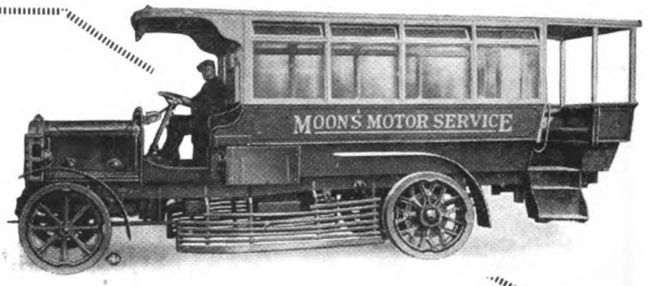

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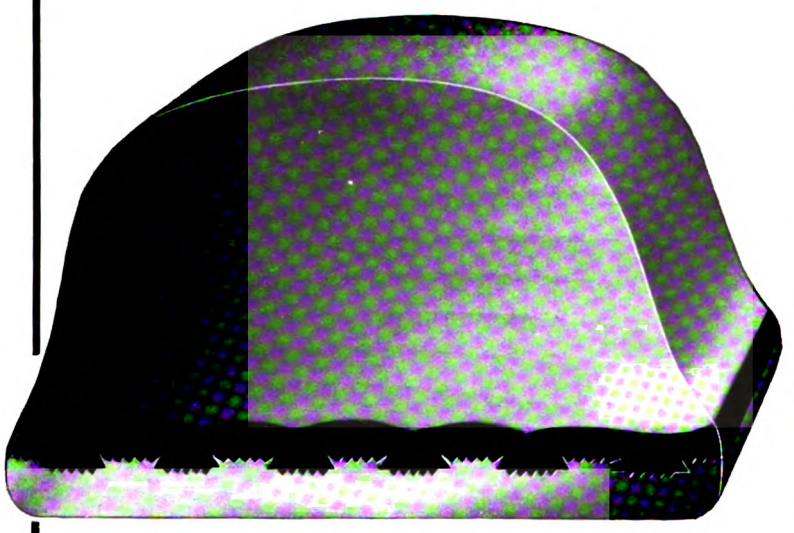

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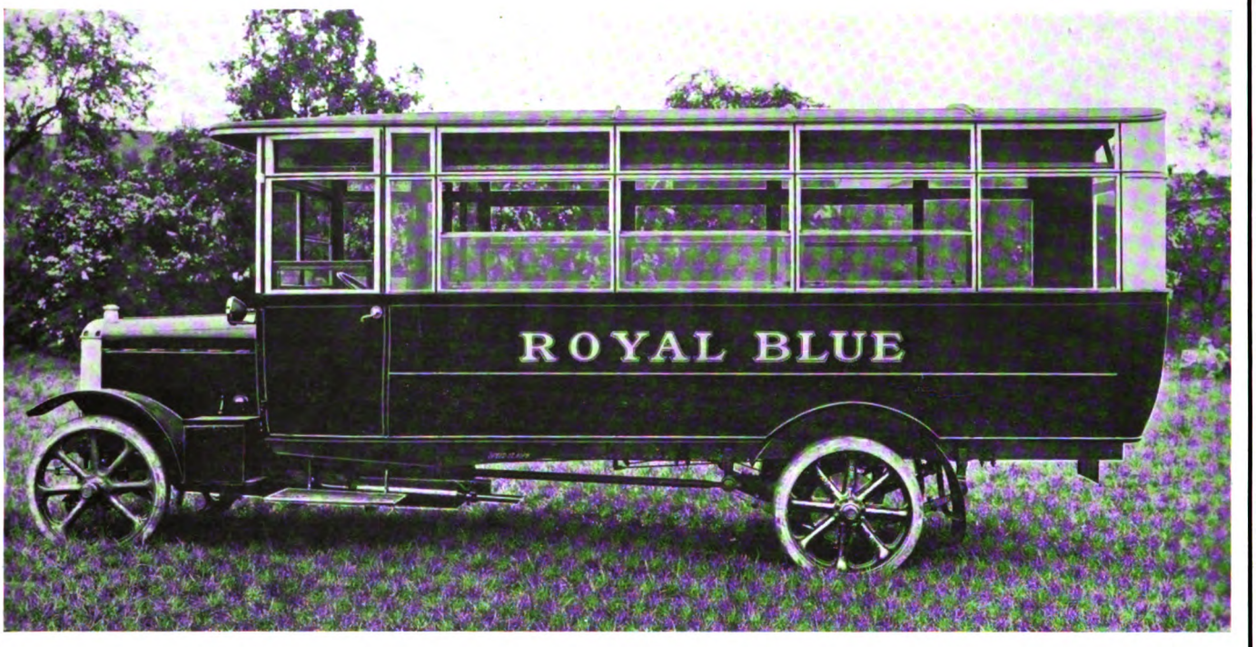

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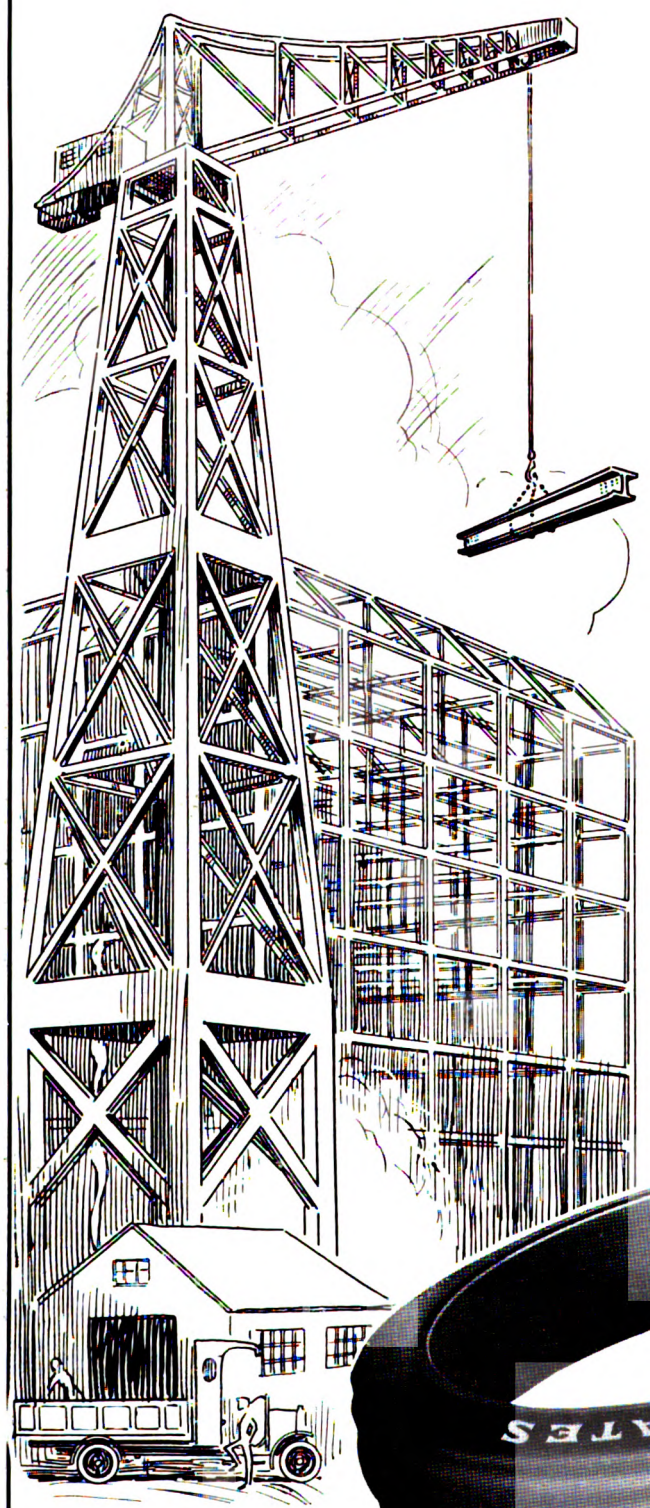

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St. Mary's Mills, Leicester

Manchester—St. Mary's Buildings, Quay Street, Deansgate; Glasgow—24 Carlton Place; London—28 St. John Square, Clerkenwell Road; Belfast—17-19 Waring Street; Bristol—63 Victoria Street; Newcastle—28 Clayton Street W.

Prices for Solid Tyres reduced by 10% from May 1st

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20,000 Miles without a single replacement

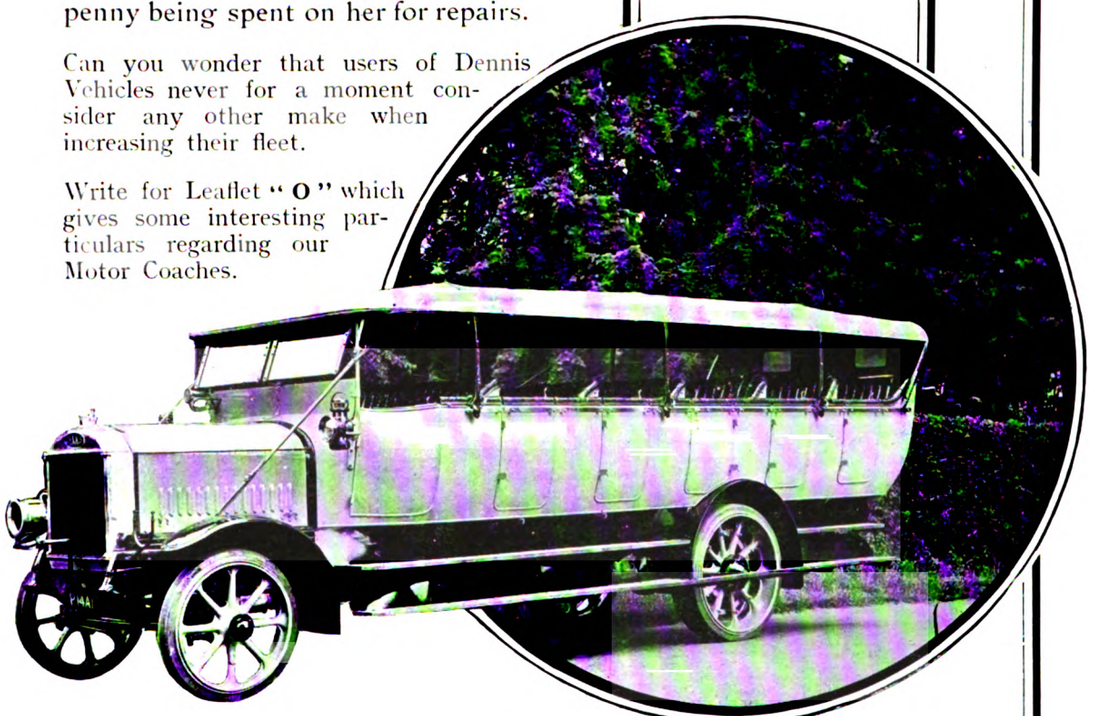
DENNIS

WE are constantly receiving creditable reports from satisfied users of our Vehicles, on the excellent service they are giving.

One letter we received quite recently (Feb. 26th) to the effect that last Season 20,000 miles were covered without a single mechanical replacement, whilst another has 16,000 miles to its credit without a single penny being spent on her for repairs.

Can you wonder that users of Dennis Vehicles never for a moment consider any other make when increasing their fleet.

Write for Leaflet "O" which gives some interesting particulars regarding our Motor Coaches.



DENNIS BROS. LTD.
GUILDFORD

The Economical Machine

Telephone—Guildford 575 (4 lines)
Telegrams—"Dennis Guildford"

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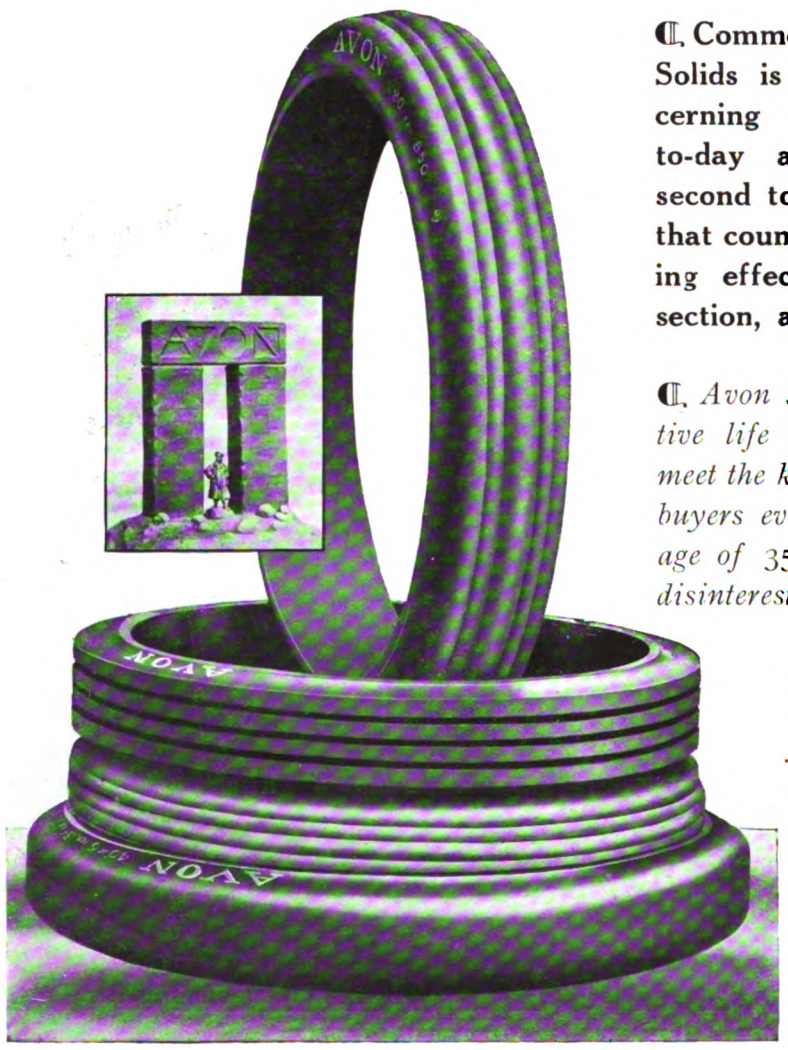
AVON
BAND TYRES

PRICES 10% DOWN

Another Avon Contribution to Reduction of Transport Costs

¶ **Comparison between present and pre-war prices reveals the astonishing fact that Avon Solid Tyres are now** *cheaper than they were before the war.*



¶ **Comment on the quality of Avon Solids is almost unnecessary. Discerning Users of road transport to-day appreciate that they are second to none in all the properties that count—in endurance, in cushioning effect, in scientific contour of section, and in cut-resistance.**

¶ *Avon Solid Tyres give longest effective life at lowest cost per mile and meet the keenest demand of experienced buyers everywhere. The average mileage of* 35 *Solids recently reported by disinterested users was* 15,284.

¶ Traders are invited to write for the Wholesale Price List S.T.12 (T) and for particulars of the Avon Contract Rebate Terms.

The AVON INDIA RUBBER CO Ltd
343-5 Euston Road. London N W 1

Works (Est. 1885) Melksham and Bradford-on-Avon, Wilts.

Stock and Service Depots at Manchester, Glasgow, Bristol, Birmingham, Leeds, Newcastle, Liverpool, Nottingham, Swansea, Aberdeen, Dublin, Belfast.

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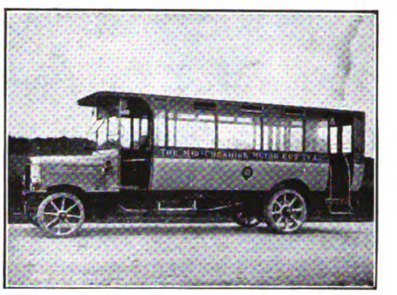
A specially-designed front-entrance 'bus built for the Birkenhead Corporation.

Illustrates the rear interior of the Edinburgh type single-decker.



One of 7 machines as supplied to the Mid-Cheshire Motor Omnibus Company.

MOTORBUS *or* TRAMCAR?

THEIR RELATIVE RENEWAL COSTS

THE cost of extending or renewing tramway tracks and equipment is well-nigh prohibitive these days.

The MOTORBUS is *the* economical alternative
The "LEYLAND" is *the* Motorbus

AT the last annual meeting of the Eastbourne Corporation Motor Omnibus Department, the General Manager says—

> **"The ten new Leyland vehicles supplied during the year have proved excellent machines and have done very good service.**
>
> **It will be satisfactorily noted that during the year £1,400 has been transferred from the funds of this department to the relief of the rates."**

Send for catalogue to the Leyland Head Office or any of the Company's Depots or Agents.

By Royal Appointment

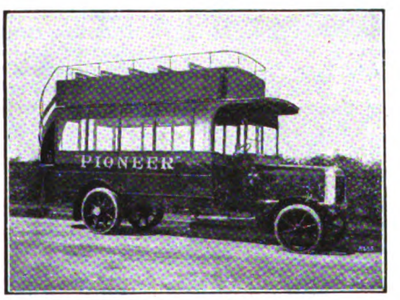
Leyland Motors Ltd.

Head Office and Works
LEYLAND ——— LANCS.

DRIVERS' SUGGESTIONS

PRIZES of £5, £3, and £2 are awarded every quarter for best suggestions for the improvement of Leyland Vehicles. Send suggestions, with sketches if possible, and chassis number, to Box L, Head Office.

A Double-Deck Subsidy-Type Leyland with seating accommodation for 45 persons.



A comfortable and roomy vehicle. A Double-Decker in Service at Penzance.

A 45-Seater Leyland, having a 36-40 h.p. engine and worm-driven rear-axle. It has Moquette Upholstery.

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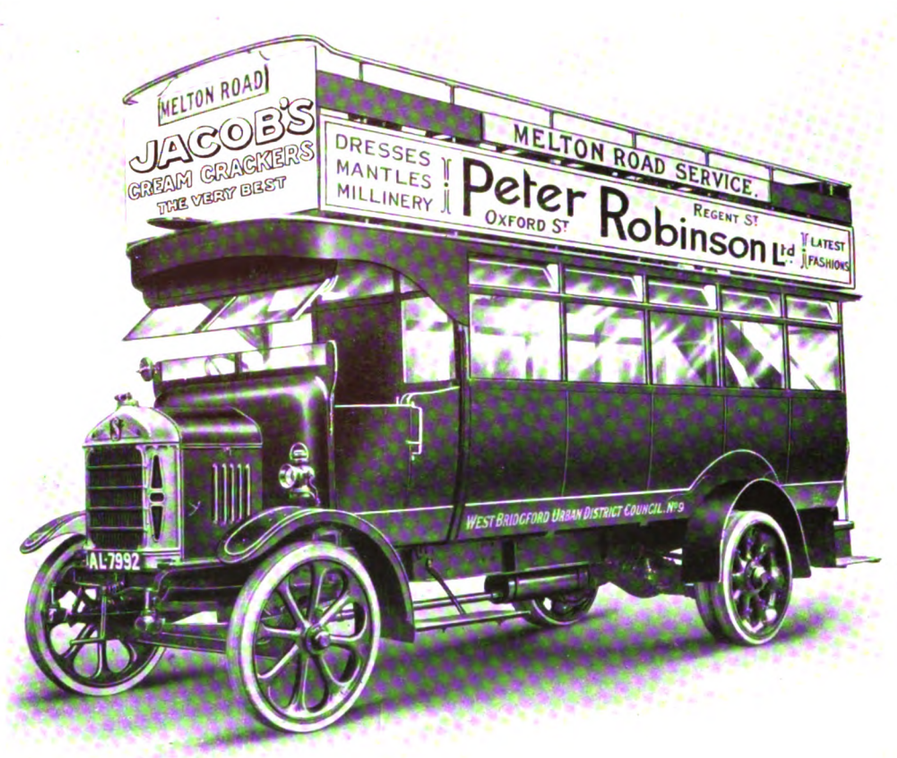

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Edinburgh Corporation Tramways and Omnibuses.
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Leeds City Tramways.
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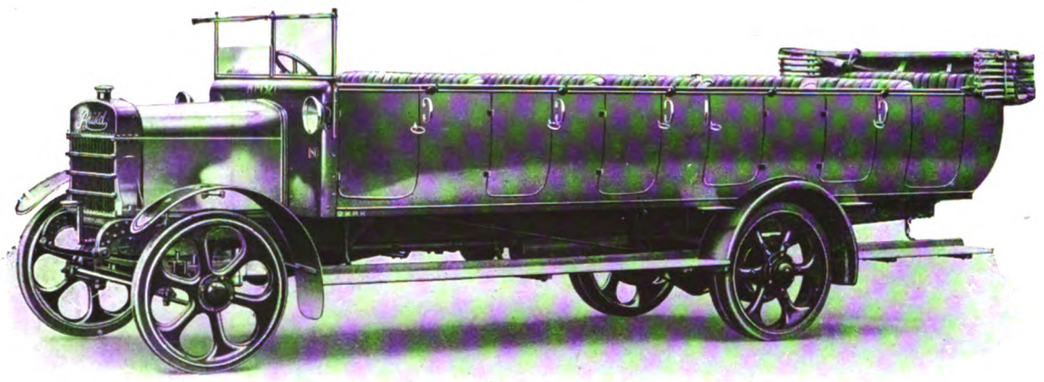
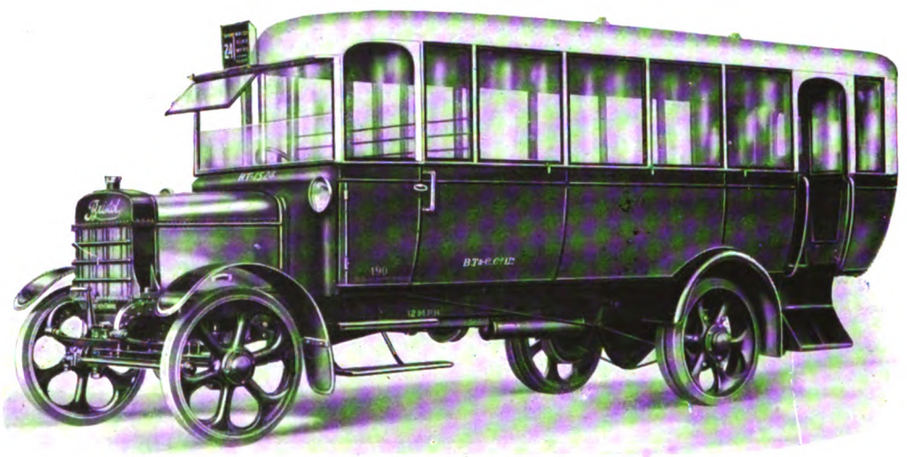
"Bristol"



40-H.P. 28-SEATER 'CHAR-A-BANCS.



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BRISTOL

Telephone
BRISTOL 4260

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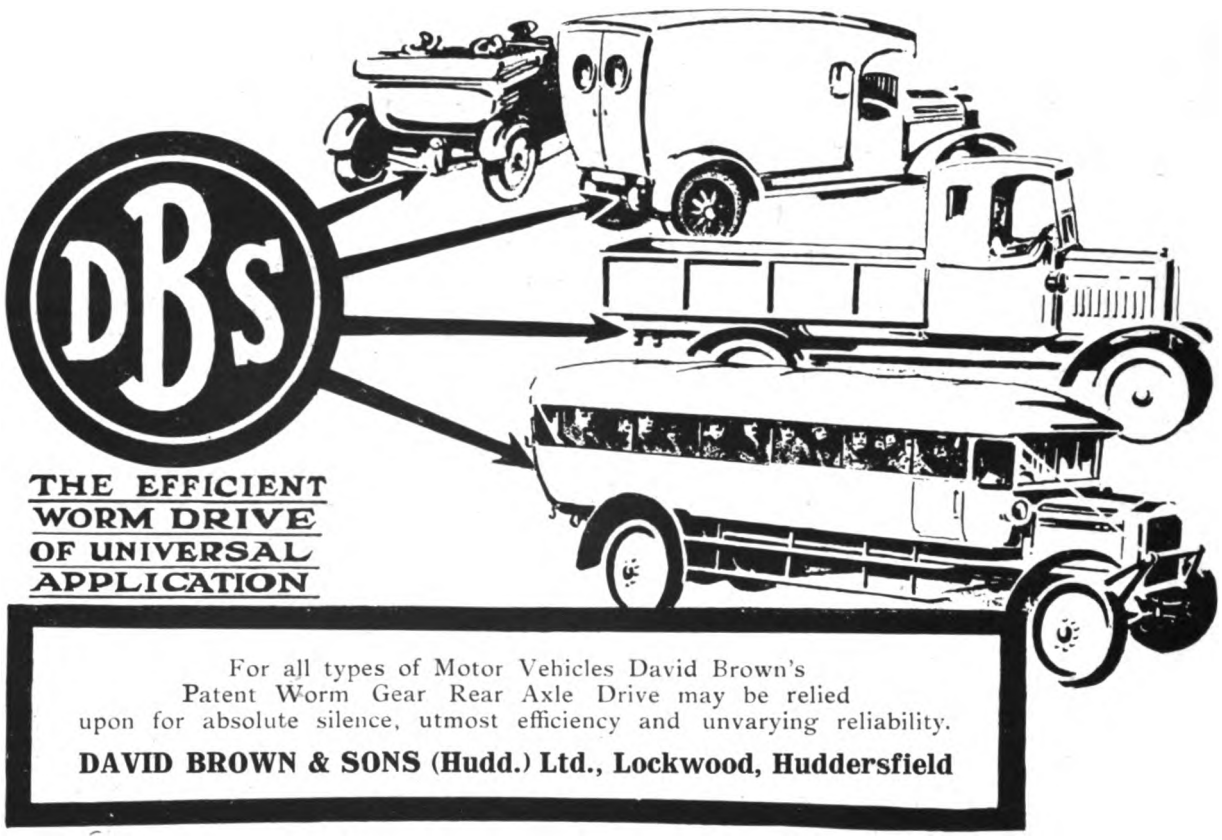

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AND
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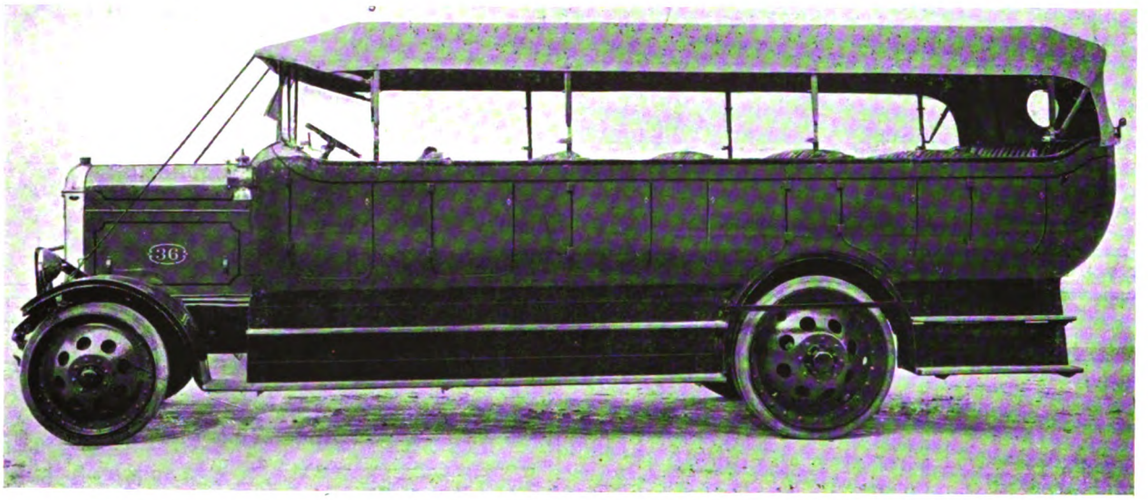

One of a Fleet of 28-Seater Motor Coaches built for the Thames Valley Transport Co

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Quality is the Only Test of Merit

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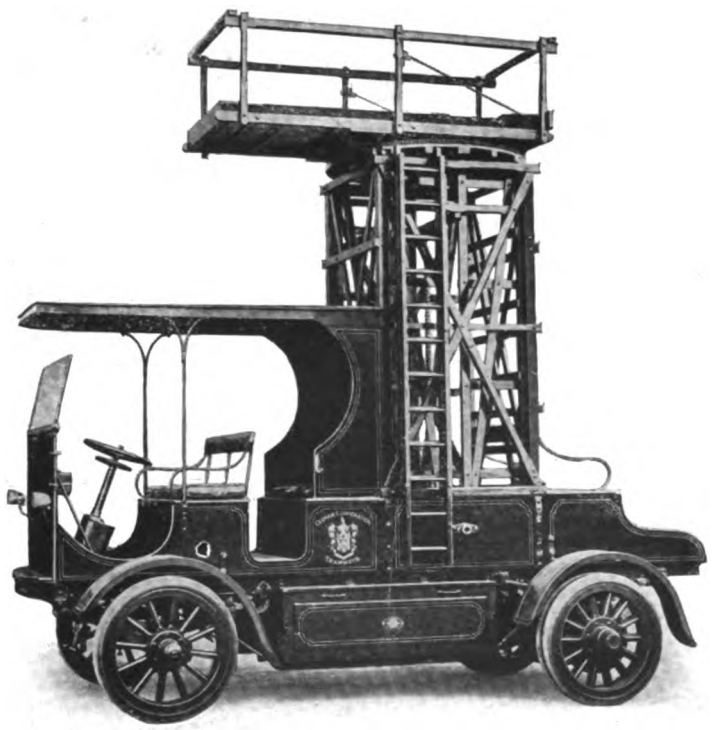

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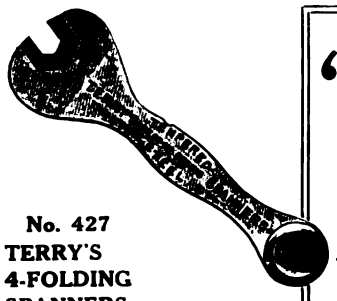

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In compact space, they give a useful grip range of four sizes, and take up little room when folded. Made from best quality hardened and tempered Steel. They give Years of hard service.

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No. 1. 5/32 in. to ¼ in. across flats...	1/-	1/6
No. 2. ¼ in. to 7/16 in. across flats ...	1/9	3/-
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Per Set.

"TERRY"

Springs Spanners Washers &c

for uniformity of quality

UNLESS the little things have good staying power, and are reliable under test of service—the whole efficiency of the system is lowered. The uniformity of quality our production methods guarantee makes "TERRY" quality safe and profitable to use.

May we quote for your supplies?

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Manufacturers
REDDITCH
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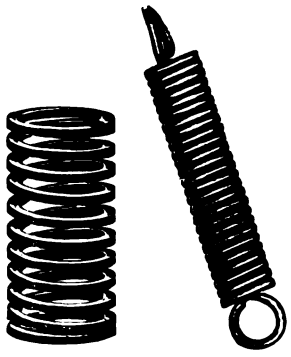

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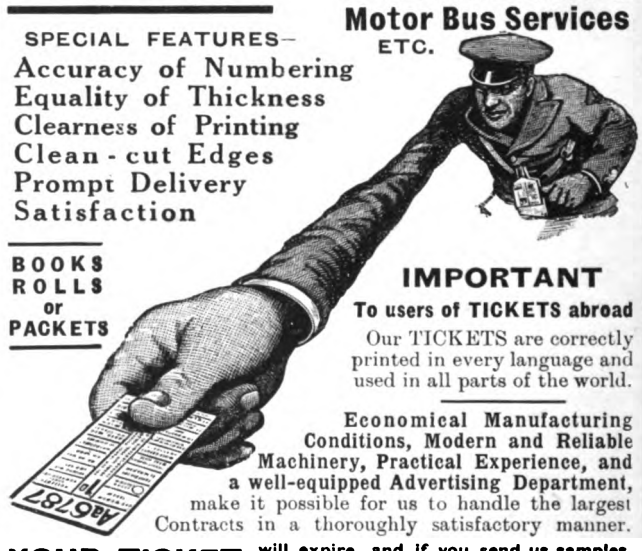

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Our TICKETS are correctly printed in every language and used in all parts of the world.

Economical Manufacturing Conditions, Modern and Reliable Machinery, Practical Experience, and a well-equipped Advertising Department, make it possible for us to handle the largest Contracts in a thoroughly satisfactory manner.

YOUR TICKET CONTRACT will expire, and if you send us samples, stating quantity used annually, you will place your future orders with us when you compare our quality and prices ::

THE VISIBLE HAND PUNCH—to cut out round hole
This is the best Visible Punch on the market, and it cannot fail to give absolute satisfaction. The special feature of this Punch is that you can see EXACTLY WHERE you are punching the Ticket. Specially adapted for cancelling times, dates, &c. in the body of the Ticket.

Inspector's Ticket Nippers and Punches of every description

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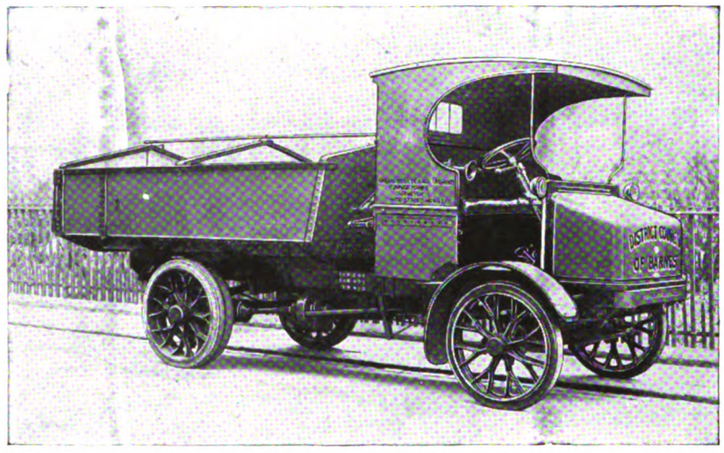
ELECARS, EDGE, LONDON.

One of our Latest Municipal Type Electrically Operated Tipping Wagons of 50 cwt. carrying capacity, as supplied to the Urban District Council of Barnes.



As mentioned in our previous announcement, the Borough of Islington has ordered Ten Tipping Wagons of the type illustrated above.

SUBMIT YOUR TRANSPORT PROBLEMS TO US.
ADVICE AND ESTIMATED RUNNING COSTS FREELY GIVEN.

Communicate with our nearest Representative—

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MIDLANDS - - -	J. P. KEMP, 62 Broad Street, BIRMINGHAM.	*Telegrams*—"Consult, Birmingham." *Telephone*—Midland 1554.
SOUTH WALES - -	ELECTRIC MOTORS (S. WALES) Ltd., 1 Wood Street, CARDIFF.	*Telephone*—Cardiff 417.
IRELAND - - -	ALISTER, KIRK & CO. Ltd., Dunbar Street, BELFAST.	*Telegrams*—"Autotrucks, Belfast." *Telephone*—Belfast 3534.
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To secure the famous

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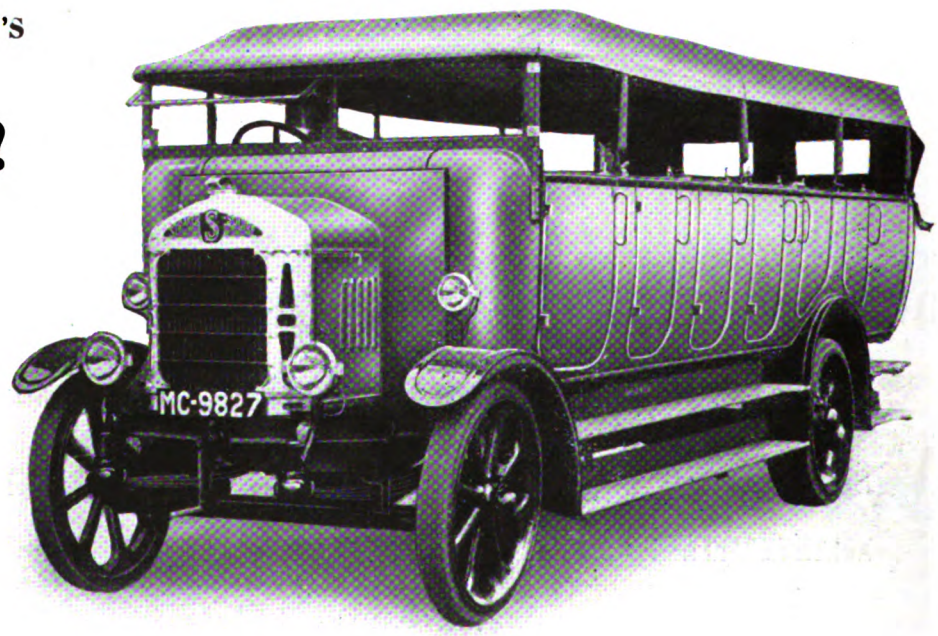
—NOW REDUCED TO—

£1,200

TO SECURE SEASON'S REQUIREMENTS

BUY NOW!



Exhibiting at the
ROYAL
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DERBY
June 28th—July 2nd

Write for Further Particulars

STRAKER-SQUIRE LTD.
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Phone— **Tottenham 2393 (10 lines)**

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On the Choice of a Solid Rubber Tyre

No. 1 "BRAND"

Vehicle-cost-per-ton-mile—not purchase price or tyre-cost-per mile—must be the decisive factor.

The *best* tyre is that which is the most *economical* and most *efficient*. It must embody the practicable maximum of the four essential properties:

CUSHIONING CAPACITY
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DURABILITY
RESISTANCE TO CUTTING

so that low tyre costs are not secured by incurring heavy expenditure for vehicle repairs and damaged loads.

Experience alone can produce such a tyre: Dunlop is indicated in manner convincing.

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The 40 h.p.

THORNYCROFT

"County"
Motor Omnibus

ALL interested in passenger transport are invited to apply to us for particulars of this extremely smart and serviceable single-deck model.

2, 3, 4 & 5-Ton Models—for all Passenger and Commercial transport

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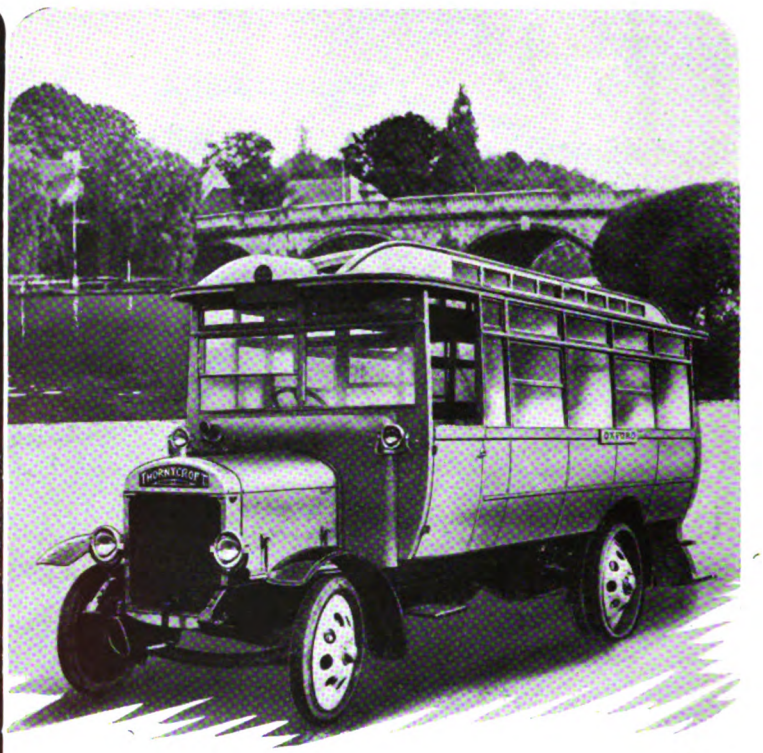

Penny fare Comfort at a Profit

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Telegrams "TICKETS, GLASGOW"

If you ask that question of the managers of the largest tramway undertakings, both at home and abroad, the answer will be—

"Yes, we use Glasgow Tickets."

May we send you some specimens? We produce tickets in any style, in any quantity, and print in any language.

Whenever you want tickets, either paper or pulp, we shall be pleased to quote you.

Freedom from ticket worry will be assured if you send your orders to

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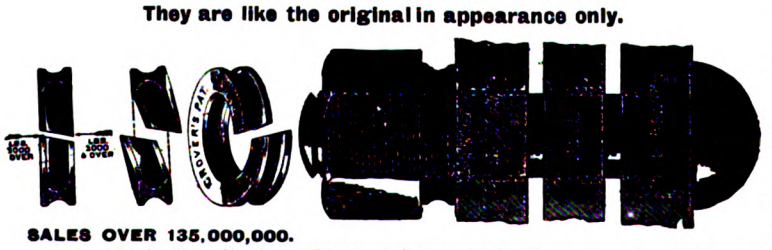
BEWARE OF ALL CHEAP IMITATIONS
They are like the original in appearance only.



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Made in all sizes from $\frac{3}{16}$ in. to 4 inches, and in Millimetres.

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FISH BOLTS (Iron or Steel)
ROLLING STOCK,
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NO ZINC, IRON, OR PUTTY USED.

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Millions of superficial feet in use on thousands of Structures.

Write for full Illustrations, Testimonials, and Particulars (sent post free).

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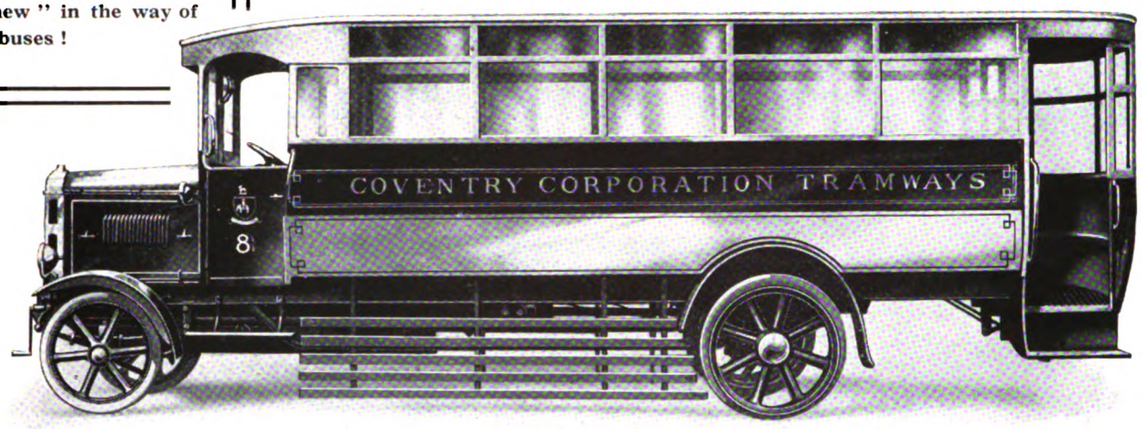
This is one of a fleet of Maudslay 'Buses recently supplied to Coventry. They are —well "something new" in the way of 'buses!



The amazing new

MAUDSLAY

'Buses

They seat 36 passengers—the largest seating capacity of any single-decker on the roads of England. *And they weigh seven cwt. less than Coventry's other 'buses*, which only seat 28 passengers. How's that for efficiency of design? For weight is in no respect sacrificed to strength in our new types of 'buses.

Where Coventry's earlier 'buses climb painfully up Coventry's hills on third speed, these "romp up" on high. Yet Maudslay running and upkeep costs are very low—almost proverbially so.

If you are interested in passenger carrying vehicles for strenuous service—'buses or chars-a-bancs—Maudslay designs are of paramount importance to you.
We shall be pleased to go into the matter very fully on hearing from you.

THE MAUDSLAY MOTOR CO LIMITED——————COVENTRY

LONDON OFFICE— — — — — — 89 UNION GROVE S.W.8
Phone—Brixton 2675 *Wires*—"Maudslay, Claplane, London."

Every "Maudslay" user in the Home and Southern Counties should particularly note this telephone number—**Park 4433.** *This number will call our new Service Station at Wood Lane, Macfarlane Road, Shepherds Bush at which breakdown gangs, fitters and relief vehicles are always available in the event of collision or other accident. From this same address trained inspectors will also be sent out to anyone requiring advice or mechanical assistance.*

2007

15

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BARTLE'S SPECIAL 'BUS DESIGNS

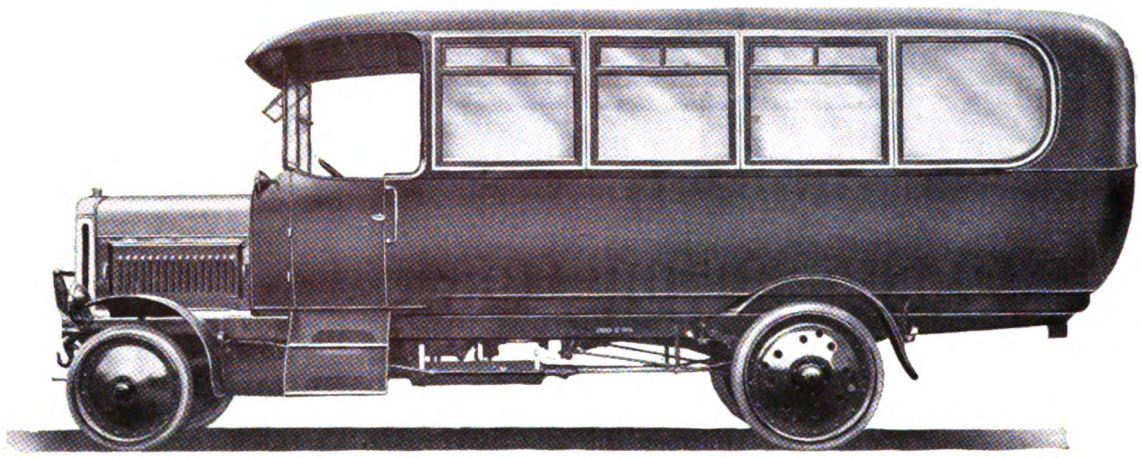
are not only

The Most Attractive in Appearance

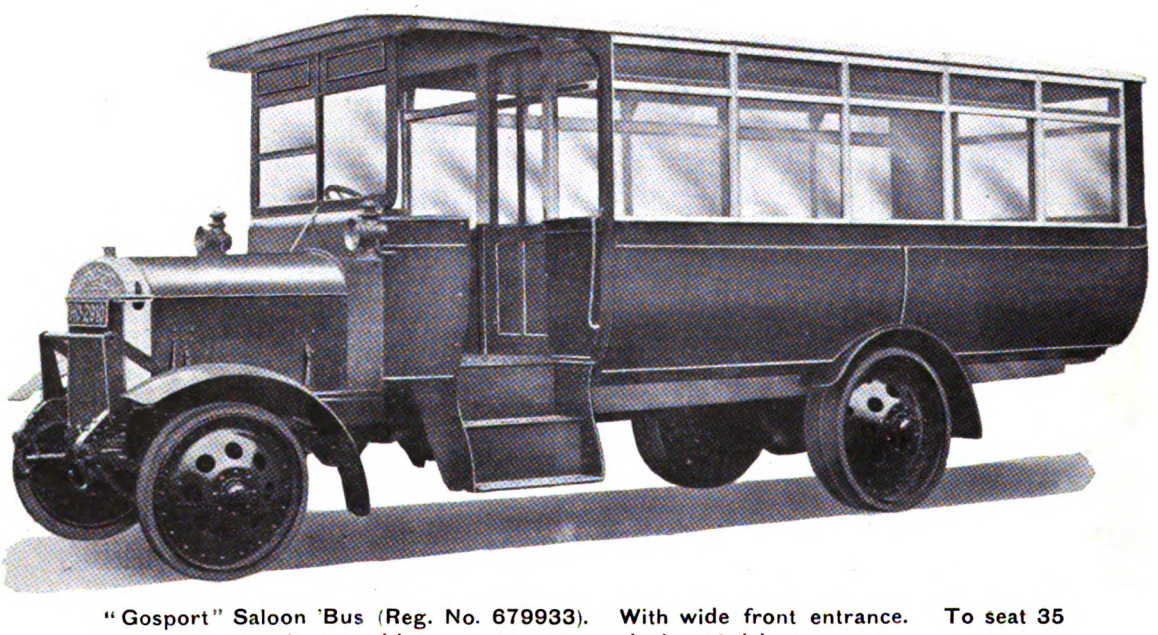
but combine

THE HIGHEST DEGREE OF COMFORT WITH ALL-ROUND UTILITY

for All Classes of Public Service Vehicle Work



"Portsmouth" Saloon 'Bus (Reg. No. 673149). Windows to take out, drop or hinge. With or without hind entrance, Half or full doors to front seat. Seating capacity from 25. The most elegant 'bus on the road.



"Gosport" Saloon 'Bus (Reg. No. 679933). With wide front entrance. To seat 35 with gangway seats, exclusive of driver.

ANY TYPE ESTIMATED FOR IN LARGE OR SMALL QUANTITIES

JAS. BARTLE & CO. LTD. LANCASTER ROAD NOTTING HILL **London, W.11**

Telephone—Park 2604-5 *Telegrams—"Bartle 2605 Park London"*

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is your Tyre Equipment. Look, therefore, to your tyres and see that they are quality tyres which will enable your lorry to function to its fullest capacity.

Such tyres are

SPENCER-MOULTON
AND
WOOD-MILNE
SOLID BAND TYRES

They are the best that experienced British workmanship can evolve from the finest of raw material, and have behind their manufacture over 70 years of experience in the handling of rubber.

They are the tyres
To Carry the Load
To Cushion the Load and
To Protect the Mechanism of the Vehicle

ENQUIRE FOR FURTHER PARTICULARS
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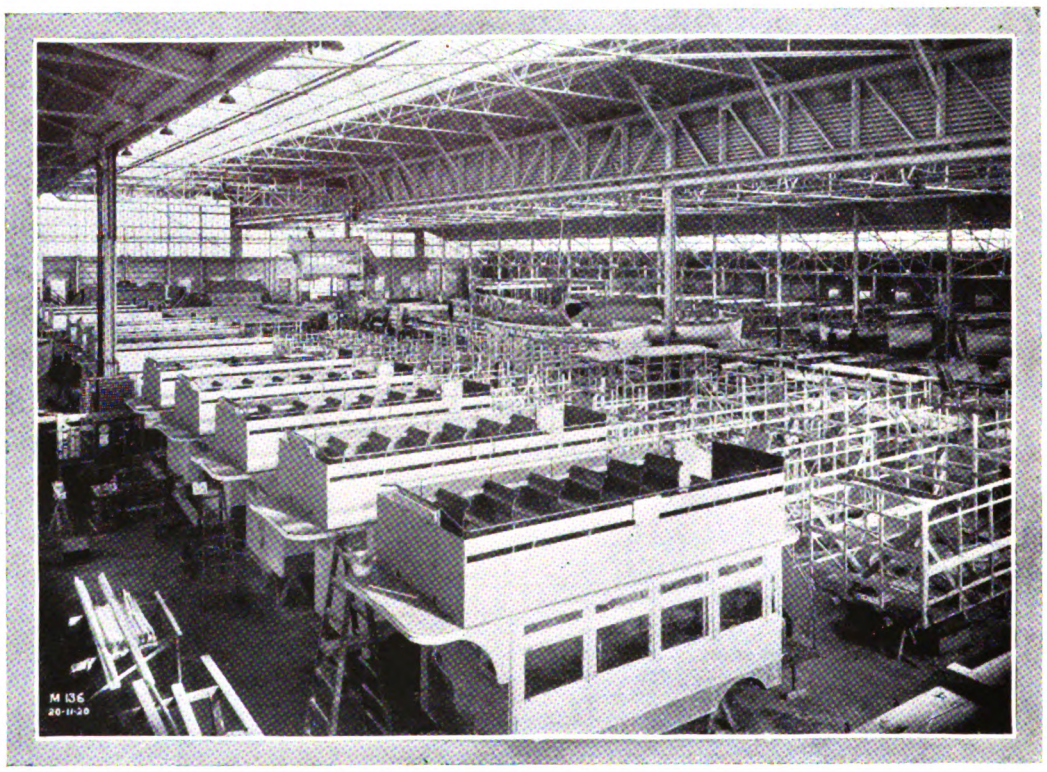

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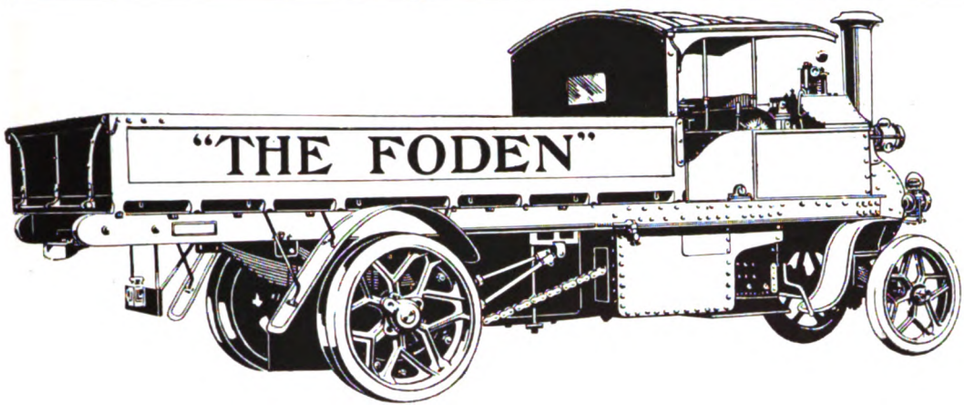

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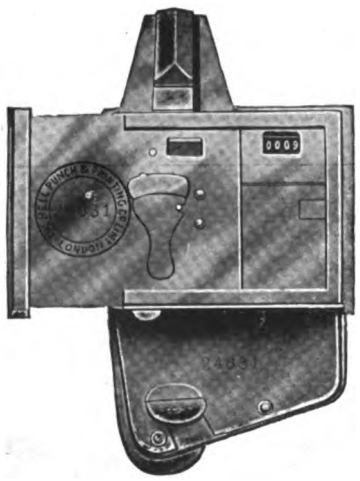

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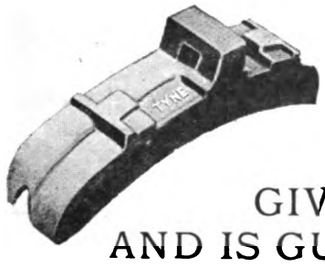

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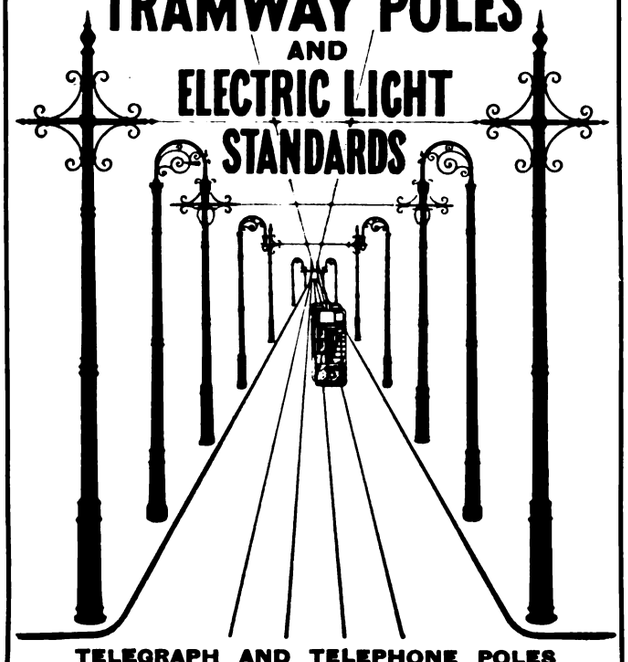

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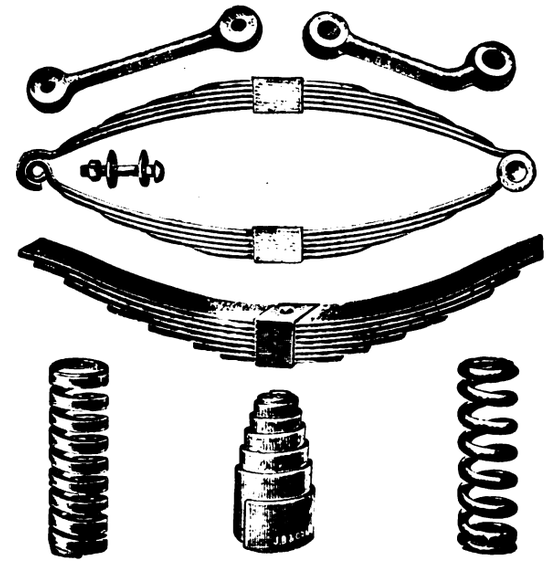

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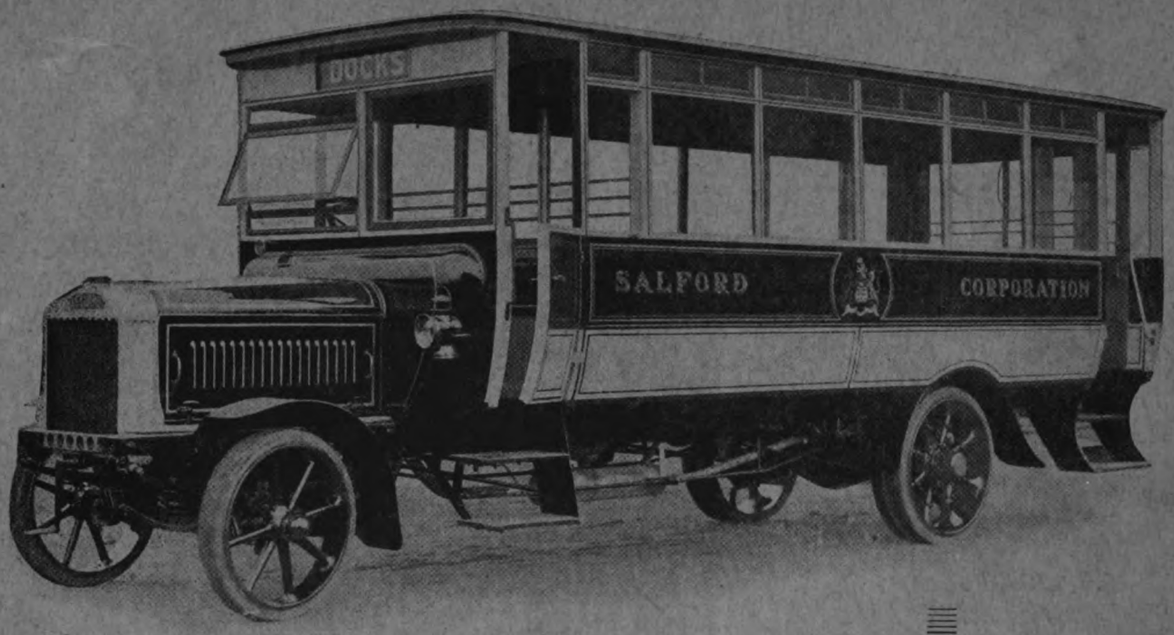

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